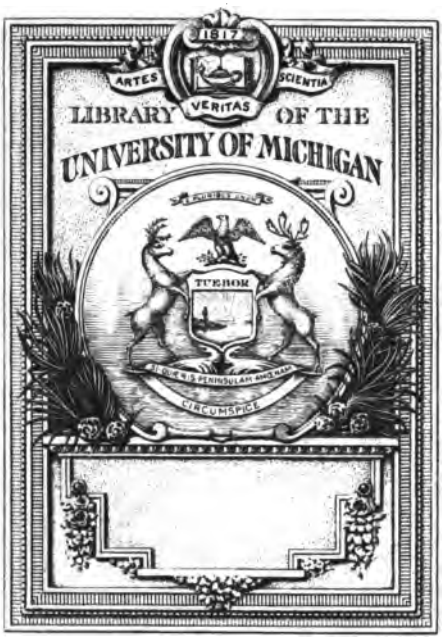
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EXPLANATIONS OF

AND

REMARKS ON

STAFFORD'S PATENT DRYER

AND

COOLER:

TO WHICH INVENTION THE AMERICAN INSTITUTE, AT THE GREAT FAIR HELD IN NEW YORK, IN OCTOBER, 1847, AWARDED THEIR FIRST PREMIUM,

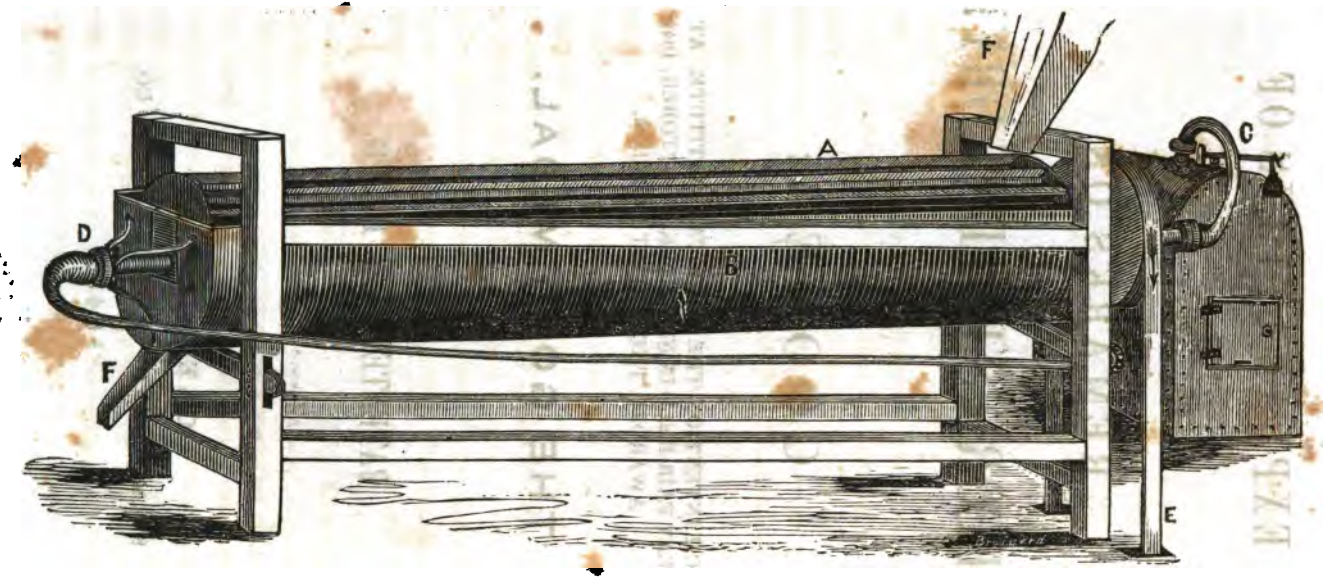
THE GOLD MEDAL.

PATENTED AUG. 14, 1847.

CLEVELAND:

STEAM PRESS OF M. C. YOUNGLOVE & CO.

1848.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DESCRIPTION.

The engraving represents Stafford's Revolving Dryer and Cooler, for drying and cooling Grain, Flour, Meal, and other substances. It is a revolving cylinder made of iron, to which are attached numerous flanches, as shown.

B, is the trough in which it revolves; steam is admitted at C, which heats the cylinder and flanches; all of the condensed water is thrown out of the cylinder at every revolution, and flows back into the boiler by the pipe D. The boiler being thus constantly fed with water a few degrees below the boiling point, and no moisture escaping except through the safety valve, other supply for the boiler is not required more than once during the day; consequently but very little fuel is requisite to keep up the steam at the desired pressure. The cylinder and trough lay on an incline, as shown. The substance to be dried is spouted upon the upper end of the cylinder; the cylinder is revolved in the direction of the arrows. by means of the belt E; the substance to be dried is carried over the cylinder many times, gradually working its way to the lower end, where it is conducted off by the spout F. All ground substances are retained upon the cylinder until all the moisture they contain is expelled, which takes only a few minutes. When used in a steam mill, the escape steam may be made use of.

Grain requires time to dry it; the passage of grain over the cylinder heats it, the action of the heat expands the moisture within the grain, the internal pressure forces it to the surface, the bran resists its rapid expulsion; time and ventilation are required to complete the process. It is conducted from the cylinder into a ventilator, which discharges at the lower end by

a regulating gate, as much as it receives at the top; the weight of the grain keeps it in motion; the heat imparted to it is lost while passing through the ventilator; all the moisture that the heat was capable of disengaging will have been expelled.

Ventilation in this fixture is nearly as perfect as upon the cylinder. More or less moisture may be abstracted—pressure of steam, revolutions and inclination of cylinder, determine the amount. The ventilator occupies but little space that is useful in a mill or ware-house, to dry many hundred bushels of grain in twenty-four hours. Letters patent have been granted for the ventilator.

The patent for the Dryer and Cooler secures to the patentee the method of drying and cooling upon the *external surface of cylinders*, which are armed with *flanches or other devices*. Hot air or steam may be used as heating agents, and cold air for cooling purposes. The patent is not restricted to any particular form, size, or device.

The invention of the patentee is based upon the theory, *that without the presence of air and moisture, no organic body can change.*

If it be desirable to preserve bread-stuffs in quantities, the moisture must be expelled by artificial means, in doing which, and to avoid any chemical change in the substance operated on, there will be found to be three requisites, viz:

1st. A uniform heat at a comparative low temperature.

2d. A constant motion that shall produce a continual change of surface.

3d. Free ventilation.

Having discovered what was essential to preserve bread-stuffs, the next object the patentee sought to attain was the most simple, cheap, and effective manner by which the process might be accomplished. After many machines had been tried and rejected, the Revolving Dryer and Cooler, as represented, was adopted. It answers the purpose intended, and to its simplicity, cheapness, and efficiency, may be added, that it occupies but little space, *and its management does not require any previous experience.*

As flour and meal are non-conductors, it is absolutely indispensable that all the particles should come in direct contact with a heated surface, and should almost immediately be exposed to a free ventilation, that the moisture can escape. This can only be done on the outside of a cylinder; for when done on the inside, a sliding motion is given to the mass. If flanches are attached to the inside to give a falling motion, the air circulating through the cylinder must carry off the finer particles, as well as cool the cylinder. The difference between drying on the inside or outside of a cylinder of 40 inches diameter, is that the grain or meal cannot occupy more than 40 inches of surface in the former, while it occupies 360 inches of surface of cylinder and flanches of the latter; and instead of heating massive ovens, (*where it is impossible to keep a uniform heat*), for pans and cylinders to move or revolve in, the heat gathered within a cylinder is all absorbed by the substance drying.

The advantages claimed by the patentee for his Revolving Dryer over all others, are—

1st. That it dries all substances without the possibility of change of quality, color, or flavor.

2d. That it occupies less space, takes less fuel, and does more work, than any other Dryer.

3dly. The only attention required is to keep up steam sufficient to blow off at the valve weighed at any desired pressure.

4thly. The motion and the heat being uniform, with sufficient capacity of Dryer, a given amount of grain or other substances must be dried, without destroying their vitality.

5thly. That the principle involved in this Dryer precludes the possibility of substituting any other efficient mode of attaining the desired end.

The patentee is fully aware of the importance of his invention. Yet he knows that but a moiety of the benefits arising from its sale or use, can recur to him; he therefore offers to the

public to either supply machines, or to sell territory in portions desired.

Letters, post paid, addressed to J. R. Stafford, or to Lemuel Wick, Sec'y, Cleveland, Ohio, will meet due attention.

Cleveland, July, 1848.

The undersigned, a Committee appointed at a meeting of the Farmers' Club of the American Institute, held on Tuesday, the twenty third of May, eighteen hundred and forty eight, at the Institute Rooms, in the Park, to examine "Stafford's Patent Revolving Dryer and Cooler, for drying and cooling Grain, Flour, Meal and other substances," beg leave to present the following

REPORT AND RESOLUTIONS:

Your Committee, in order to obtain an accurate knowledge of Mr. Stafford's apparatus, invited him to put the whole in practical operation, at the rooms of the Farmers' Club, in the presence of your Committee, and such persons as should be invited to attend. Upon the day appointed, the apparatus was shown to the Committee and a number of strangers, and others who were present by invitation; and the whole process, which is extremely simple, of drying flour and meal, was practically demonstrated.

Mr. Stafford used a Model before the Committee, with a cylinder about eighteen inches in length; the flour and meal used was placed in a trough, in which revolves a cylinder, with several flanches fastened to the periphery, running longitudinally. The end of the cylinder connected with the steam pipe, is elevated so that the cylinder, when in motion, represents an inclined plane; the flanches stir the flour and meal upon the bottom of the trough, and in the revolution of the cylinder, throw them up and carry them forward. The cylinder is heated with steam, to a temperature of 212° Fahrenheit's thermometer; and from the time that the flour and meal enters the trough, to the moment that the dried product descends into the cooling vessels, that part of the cylinder which is exposed to the action of the atmosphere, is constantly loaded.

Mr. Stafford informed your Committee, that an apparatus to dry and cool the work which may be ground with four runs of burr stones, could be furnished at an actual outlay for labor

and materials of construction, of about three hundred dollars; that a single cylinder of sixteen feet in length, and twenty two inches in diameter, will dry and cool one hundred barrels each, of one hundred and ninety six pounds of flour or Indian meal, in a day, of twelve hours, and perform the drying or cooling in a proper manner.

Mr. Stafford's theory is exceedingly simple, and for that reason, will be easily understood.

First. That the flour, meal, or grain, is subjected, in his drying and cooling apparatus, by the agency of steam, to a uniform degree of heat at a low temperature.

Second. That the Drying and Cooling apparatus invented by him, offers an extended surface in a compact form.

Third. That the flour, meal, or grain, while in process of drying or cooling, is constantly in motion, and by the combination of the steam, and the motion of the cylinder, the moisture is effectually expelled.

Chemical analysis heretofore published, has shown that wheat, rye, buckwheat and Indian corn, and also the flour and meal manufactured therefrom, when under the influence of water, air and warmth are either partially or entirely changed, so that the ultimate principles of each of the grains named, (oxygen, hydrogen, carbon and, in some cases, nitrogen,) combine in new proportions, and of course form new compounds. To this process of decomposition, the general name of fermentation has been given—it differs according to the substances acted upon, and the circumstances in which the article is placed. There were formerly enumerated five species of fermentation, viz: 1. The saccharine fermentation, in which starch and gum are changed into sugar. 2. The vinous fermentation, in which sugar is converted into alcohol. 3. The mucilaginous fermentation, in which sugar is converted into slime instead of alcohol. 4. The acetous fermentation, in which alcohol and other substances are converted into vinegar. 5. The putrid fermentation or putrefaction, which characterizes the decomposition of organic substances, as wheat, rye, buckwheat, Indian corn and vegetable azotized substances.

Recent chemical experiments combined with a more intimate vegetable analysis, show that our former knowledge of the process of fermentation was very limited; that the several phenomena of fermentation, and the change which it effects among the various subjects, are no less striking and mysterious than important in the several applications to the arts of life. Fermentations are now arranged into twelve classes: 1. The alcoholic; 2. The glucosic or saccharine; 3. The viscous or mucous; 4. The lactic; 5. The acetic; 6. The gallic; 7. The pectic; 8. The benzoilic; 9. The sinapic; 10. The ammoniacal; 11. The putrid, and 12. The fatty.

The process of fermentation requires 1. a temperature from 45° to 90° of Fahrenheit's thermometer; 2. The presence of water; 3. The contact of air; 4. The presence of a neutral organic azotized matter in a very small quantity, and of a crystalizeable, non-azotized substance in considerable quantity. The former is the ferment, the latter undergoes fermentation.

The subject might be examined to an almost indefinite extent, but your Committee will only add that Mr. Stafford's apparatus, *when used according to his directions, puts an end to fermentation of every kind*, to wit; The flour or meal is placed in the trough containing the cylinder, over the surface of which, the flour or meal moves. The steam is admitted into the cylinder, and expels the moisture which holds in solution the several fermentative qualities. When the flour or meal has reached the end of the cylinder, a period, in a full sized machine, of about eight minutes, it is ready to drop into vessels where it may be acted upon by cold air for cooling purposes, the process is complete, and the flour and meal is ready to be shipped to any climate, and will keep an indefinite length of time.

In the year eighteen hundred and thirty eight, one of the undersigned received from a friend a sample of wheat, which, it was said, had been produced from seeds received from Pompeii —circulated by the Emperor of Austria, through the several ministers of legation at Vienna. Pompeii, we are told, was destroyed partly by an earthquake, A. D. sixty three, and in the year seventy nine, was buried by a stream of lava and ashes.

The lost city was discovered in seventeen hundred and forty eight. In the year eighteen hundred and thirty seven, what was supposed to have been a Miller's shop, was discovered. In the centre of the shop was a heap which furnished a few bushels of wheat—the wheat was divided among the Foreign Ministers, by the Ministers divided, and afterwards sown, and produced abundantly. The heap from which the wheat was taken, was surrounded with lava and ashes in the Miller's shop, and to the absence of air and moisture must be attributed its preservation for nearly two thousand years, where it had laid lava-locked in the bowels of the earth—a proof that if air is excluded and *moisture extracted or driven off from wheat or its product*, the *remaining matter is indestructible.* The undersigned, regard any apparatus which has for its basis, the preservation of the food of man, is invaluable; and peculiarly so at the present time, when a part of the Old World is deprived of the most nutritious of esculents. The United States offers her wheat, rye, buckwheat, either in the grain or made into flour, to make up the loss, and adds to the treasure, a crop of Indian corn of *over five hundred millions of bushels annually.*

The American people in the year eighteen hundred and thirty seven, had the experience of a year of scarbity with importations from Europe and the Black Sea. In the year referred to, and the following year, our merchants imported large quantities of Cereal grains and flour, nearly all, if not all, of which, had passed through the ordeal of imperfect kiln-drying, but who can say that, during his experience, he purchased, or knew of the purchase of a barrel or a pound of pure sweet flour, or a bushel of sound, merchantable grain? The flour was musty or sour, from fermentation, and the grain was equally affected. Mr. Stafford regards his apparatus as capable of overcoming all the difficulties that we have named, and even more.

The undersigned have suggested that the process of fermentation commences at any point of Fahrenheit's thermometer above forty five degrees, and up to ninety degrees. With our extended sea-board and inland seas; by the great lakes and western rivers, there is a trade carried on between State and State,

which far exceeds the foreign exports of the United States, and where our breadstuffs are required with an increasing market.

To prepare the superabundance of the grain fields of the great West, South-west and South for a market, whether at home or in Europe, and to prepare the grain or flour, with a certainty that either will keep in any climate, Mr. Stafford offers his apparatus. He has referred your committee to documents showing that in April eighteen hundred and forty-seven, a large parcel of Corn Meal was ground at Elyria, (Ohio,) and in the month of May, following, shipped by the way of Lake Erie and the western canal to the city of New York. The shipper offered to guarantee the Meal to keep its flavor for five years in any part of Europe. The Meal was afterwards shipped from New York to Liverpool, remained in store until the month of September, and then sold for more than any other descriptions of meal in the market. It had been three times transshipped before it arrived in New York, remained in the city during a part of a hot summer, and in a climate the most humid, proved to be superior to any in the market.

The European wheat and rye, and the wheat and rye flour which your committee have referred to, were prepared by the old process of direct action with fire, or by the use of heated air. The importations of grain and flour were sour and musty, or both—repulsive to the taste and injurious to the health.

Secondly, In the manufacture of flour from wheat or rye or buckwheat. Your committee believe that the manufacturer endeavors to preserve the shade of the flour—that is the whiteness known to belong to the flour, made from the several kinds of grains which have been named.

If it be desirable to expel the moisture after the flour is ground, and for that purpose, the agency of fire be resorted to, whether in kilns or by the use of tubes, ovens, or surface iron plates, the flour will be scorched more or less, (whatever may be the degree of care exercised,) and of course discolored. This discoloration is superadded to the fact, that fire, or the heat proceeding from kilns, ovens or surface plates, *destroys the cohesive property* of wheat flour, rye flour, buckwheat flour and

Indian Meal; therefore, your committee believe, that when the agency of fire is resorted to for expelling moisture, the flour or meal loses an essential property to make good bread.

Your committee have examined samples of wheat flour, which were presented by Mr. Stafford parts of a larger quantity from which, sixteen and a half pounds of water had been expelled, to each barrel. Your committee had no personal opportunity of practical experiment, but the samples exhibited a cohesiveness which could not be distinguished from flour, which had not passed through the Drying process.

Your committee also examined samples of white and yellow Indian Corn Meal prepared in a similar manner, *in which the cohesive property was retained*, and it would have been difficult in the opinion of your committee to have decided that there was an actual difference between the cohesive property of the ordinary, and the dried and cooled samples shown.

The cotton crop of the United States annually exported, amounts to millions of pounds, and the value is yearly increasing. The cotton crop, however, is confined to a few degrees of latitude—a mere spot—while the wheat and the rye fields, and the cultivation of the Indian Corn, extends from the St. Lawrence on the east, to the Lake of the Woods; to the shores of the Pacific, and thence in a line to the Gulf of Mexico and the Rio Grande, and up that river to the Pacific Ocean. It will require a numerator of many figures in a few years, to calculate the grain crop of the region referred to, and after the native population and the domestic animals requiring attention, have been fed, the balance will fall into the hands of the merchants for sale. To preserve the mighty mass, and to put it into marketable shape, granaries, and wagons, and mills, and canal boats, and steam boats, and ships, and brigs, and schooners, and sloops will be required; but before the grain leaves the farm, or the flour leaves the mill, the Patent Revolving Dryer and Cooler of Mr. J. R. Stafford, of Cleveland, Ohio, should be used, *and your Committee recommends its use with entire confidence, fully satisfied that it is the only safeguard for flour and meal and grain against change of climate, and the various effects which*

arise in shipment and trans-shipment, and from a low to an increased temperature.

Your committee has before it a large amount of statistical information connected with the subject under consideration, but the great length to which this report has reached, admonishes the committee not to trespass further upon your patience. Your committee beg leave to offer the following Resolution:

Resolved, That the Revolving Dryer and Cooler, for drying and cooling Grain, Flour, Meal, and other substances of Mr. J. R. Stafford, of Cleveland, Ohio, meets the approbation of the Farmer's Club of the American Institute.

(All of which, is respectfully submitted.)

GEORGE G. SICKLES,
D. C. MOREHEAD, M. D.
JAMES R. CHILTON, Prof. of Chemistry,
CHARLES HENRY HALL.

New York, June 6, 1848.

For the purpose of showing the importance which, in Great Britain, is attached to the subject to which this pamphlet is devoted, I have copied from the Westminster Review the following article. I have also appended some remarks showing the futility of the plans recommended.

PRESERVATION OF FOOD.

[From the Westminster Review].

The Granaries of Great Britain; or Perpetual Preservation of Food. Equalizing prices and diminishing risk to Food Manufacturers and Food Dealers.

Charles Lamb records that roast pig was a Chinese discovery accidentally made by the burning down of a house, and that for many years it was deemed essential to burn down houses in order to attain that delicate edible, being in fact, not roast pig, but burnt-house pig. Even thus do we in England, talk of "mummy wheat," 3,000 years old, and yet capable of germination. We have not yet asked ourselves the question whether the "mummy" be essential, or whether the wheat might not be preserved 3,000 years without the "mummy."

The painful realities of Irish famine, and the reaction more or less severe throughout Europe, has resulted in a conviction that the world, during the whole period, actually possessed a sufficient supply of food, and that a deficient means of distribution, together with a panic, peculiar to a state of ignorance, but which would not exist in a state of enlightenment, was the chief cause of the misery, excitement and speculation and wide-spread ruin to individuals that have ensued.

The question arising is, must this irregularity and misery be a constant condition of humanity? Is it an ordinance of Providence, or an ignorance that can be removed by attaining higher steps in mental and physical progress? Must we read the

Scripture phrase "the poor shall never cease from out of the land" as a denunciation of constantly recurring famine, or simply as an assertion of the physical and mental inequality of mankind, and an injunction on human power to protect human poverty? We hold to the latter! We cling to the belief that human misery is synonymous with human ignorance, and that the Being who has planted reason within us, gave us that reason to enable us to develope every branch of knowledge, and remove from us these conditions, which are positive evils to civilized humanity, but salutary laws where mere instincts are the incentives to action.

In common with the lower animals, the first want of mankind is food. Savage man, like the wild beasts, consumes natural or spontaneous food. Civilized man is supported on artificial food, in the production of which skill and labor have been applied. Wild animals, and wild fruits and roots supply wild men thinly scattered over a wilderness. Cultivated animals and cultivated plants furnish food for the cultivated men; and thus population thickens and arts advance, and it would be a very fair standard to measure the civilization of nations by the quantities and varieties of their artificial food.

In the wild state, all animal nature of the carnivorous kind is supported by prey, and the human hunter exists by the same law. Life is supported by the destruction of life. Even when we have cultivated our animal food, by changing the argali into a sheep, the bison into an ox, the savage boar into a tame hog, and many other similar processes, we only make a variation without altering the condition of the law of prey. We increase the quantity, but frequently also deteriorate the quality. No artificial animal food can compare with the wild venison of the wild thymy heath as a healthy nutriment, in producing or rather in maintaining, a sound body for a sound mind. The perception of this truth will continue to gain ground and produce a change in the mode of training animals for food, till the time shall come when the the law of prey will disappear before the law of human reason.

Let us not be understood as advocating the bigotry of "vegeta-

ble diet" as an universal food. The varieties of temperament in human beings are countless, and so should be the qualities of their food. It is the province of chemistry to solve the great question of the abolition of the law of prey, and till that be done, we must be content to follow the nature of the lower animals, obeying our natural instincts, subject to many of the evils engendered by half progress. It is a certain thing, that what we call civilization, i. e. half progress, has engendered amongst human beings many disorders unknown in a state of nature. So, also, has it done in the case of the lower animals bred by human beings for food; and it is impossible to doubt that the flesh of those animals, deposited in human stomachs, must re-act in various modes mischievously.

> "Like follows like throughout this mortal span;
> In bloodier acts conclude those who with blood began."

The practice of hunting wild animals for food engenders a disregard for animal life, which gradually extends to fellow human beings. All history will bear testimony to the fact, that hunters are men of violence, from Esau who frightened Jacob, down to Grantley Berkeley, who "punches the heads" of peasants. It was our fortune—good or bad—to sojourn for a long period in sunny climes amongst human tribes, half pastoral, half predatory, who lived on horseback, whose sole food was the flesh of recently slain animals, and their drink brackish water, their couch the grassy plain, and their roof the blue heaven. Lean, wiry, and lithe of body, with cat-like, half sleepy eyes, and long black horse looking hair, the people possessed the attributes of tigers; they passed their time half in sloth and half ferocity. Witnessing, and sometimes compelled to join in the eating of half-roasted flesh, torn from an animal just slain, and the mass still quivering, we have learned how, by slight degrees, refinement departs, and the mind becomes callous to horrors and bloodshed. The slightest word of provocation, and drawn knives to gratify revenge, the dried blood of the animal on the blade mingling with the red torrent flowing from human veins, was a common occurrence. To dress wounds was an almost daily

task, and at last a drudgery, from which even compassion shrunk. The gradual callousness of the natives of more civilized climes was remarkable. Wounds became a matter for mirth. On one occasion, encamped rudely, awaiting the attack of some hostile tribes with bristling spear, and prepared rifles, a native of Scotland, a mechanic of ordinary decent habits, tolerably educated, and possessing some five thousand pounds capital, entered into conversation with us—calculating the strategy of their position and the number that would be slain, all in the cool, quiet gutteral Saxon dialect, denominated Lowland Scotch, and, gliding from one subject to another, as easily as if discussing a chapter of Adam Smith, he thus went on. "Wall, noo, awm thinkin' that we've tried maist kinds o' flesh meat—bull and quey and cauf, and horse and mule, and lion and deer, and ostrich and armadillo, and bees-catcher and your common swine, so when the fight is over, I should like to cut steaks from one of those brown devils of Ingeuns yonder, to try what he eats like."

We looked at the speaker, thinking he jested, but it was no jest. It was simply a man of average intellect, and very coarse nerves who stood before us,—one who by force of habit might have obeyed moral laws, but too coldly practical ever to discover them for himself. He was merely going a little beyond the practices of his wild companions. They, albeit Christians, were in the habit of skinning their human foes to make horse-trappings of their hides; he, from curiosity, was desirous to taste their flesh. Possibly he might have called himself a Christian also. We did not ask him his descent, but it struck us, that after all, the story of Sawney Beane might be no fable. Such a man, placed in a position where the only food was human flesh, would have made his experiment a habit, and would have enjoyed his cannibal meal with as much relish as a chief of the Feejee Islands.

Our civilized habits, in slaughtering animals for our food, are akin to savage nature. We should regard with distaste the man who could voluntarily kill and eat his own dog, or his cosset lamb, or turtle dove. This difficulty is got rid of by selling the lamb and dove to another—exchanging lambs and doves, pre-

cisely as Feejee mothers are said to exchange their children in time of scarcity, in order not to devour their own. All this is merely cheating the conscience; palliating the evil, not trying to remove the cause of it.

If we examine the question logically, it runs thus: A large portion of people living in a state of civilization, require food of a highly stimulating kind. Our limited progress in chemistry, forbids our finding this food otherwise than animal flesh. But with refined habits the great mass of the community has acquired a horror at the thought of butchering animals. A Whitechapel kennel or Whitechapel cellar, the rows of butcher's shops, are all objects passed by and spoken of with disgust. A practical butcher we regard as a Helot. Why is this? Only because the habit of shedding blood has a tendency to brutalise. If this be so, what right have we to set others to do that which is disgusting to ourselves? Or is it a right thing to doom certain human beings to eternal brutality? There are jungle deserts in some parts of India, through which foot postmen carry the letter bags. Occasionally postman after postman disappears in succession. Search is made, and their remains, with the letters, are found in a tiger's den. This is thought horrible, and the tiger is shuddered at as something fiendlike. Yet how, in truth, does this differ from the cellar of a butcher, strewed with the carcasses of sheep and oxen? Could the tiger reason, he might complain of the injustice that holds him up to odium for keeping dead men's bodies in his cellar for food, while men in their cellars keep the dead bodies of sheep for the same object.

Can we alter this? Can we abolish the law of prey? Let our chemists fairly try the experiment. Liebig has shown that certain chemical ingredients, in certain proportions, must be taken into our bodies at intervals, in order to supply heat and the waste of our bodies. Sugar, butter, and similar substances supply the former; blood and flesh containing nitrogen, supply the latter. To procure these substances, we manure the ground with their constituent materials. On the ground so manured we grow plants. On these plants we feed sheep and cattle.

These sheep and cattle we cause to be slaughtered, and then bury them in our stomachs. The problem, then, first is, how to dispense with part of these processes?—to concentrate in the vegetables a sufficient amount of the chemical ingredients constituting flesh and fat, so as to pass them at once into the human stomach without going through the animal form? To produce animalized vegetables is the problem. Nor can this be deemed very difficult, if we divest our thoughts of cabbages, turnips, potatoes, and similar coarse, watery vegetables, and reflect that they are mushrooms—which seem to form the link between animal and vegetable substances. Our culinary vegetables in their existing state, are not natural productions, but results of art, which art may be enhanced by chemistry and horticultural skill, till it will be possible to produce a vegetable combining the qualities of the olive and the mushroom. When this shall be accomplished, it may be possible to dispense with animal food and the law of reason shall triumph in the extinction of the law of prey, by the progress of art, which is but another name for man's developed nature.

Whether our chemists will ultimately succeed in preparing nourishing and stimulating food wholly from inorganic matter, is another problem. When the mysteries of flavors and aromas shall be unfolded to us, those subtle influences which appear to constitute the principle of nutrition, it is probable that we shall attain this end. There appears to be no chemical difference betwen the odor of coal tar and attar of roses, more than between charcoal and diamond; yet in their action on our senses they are wholly distinct. It was once our lot to live for a time on the flesh of cattle driven with a caravan during a long journey. The flesh of these animals, though not lean, was devoid of all flavor. It was as tasteless as chopped hay. The people called it "tired meat." It did not nourish—the ozmazome, or animal spirit, or electricity, or whatever constituted the flavoring matter, was wanting. The same thing takes place with cooked meat which is several days old, though not putrid. If we can once discover the principle of the aromas, so as to prepare

them artificially, the arrangement of the solid basis of human food will probably not involve any great difficulty. There is no more of a miracle in this, than in the common experiment of preparing sugar from old rags or saw dust.

These are speculations, at which, probably, existing practical men will smile, till future more practical men shall realize them; and meanwhile the question remains, how most efficiently to apply our existing food in the animal and vegetable forms, so as always to have a surplus on hand, in readiness for emergencies —how, in short, to enable the speculator to store up food as well as other commodities, without risk of destruction? If a merchant buy a shipload of pipes of wine or brandy, he can deposit them in the London Docks, and they become a property, of which, if he produces the certificate of dock warrant, he can raise by mortgage within ten per cent. of the total value. But, if he buy a shipload of wheat or other grain, and deposit it in a granary, he can raise no money at all on it, because it is fluctuating in value; and moreover, "there be land rats and water rats," and mice, and thieves, and weevils, and germination, and decomposition, and expenses of turning over and measuring. In short, while the pipes of wine remain a fixed quantity, the grain is a constantly decreasing quantity. *It goes into the granary corn and comes out rotten bran.*

It has often occurred to us that the term "animalized biscuit" may have originally been suggested by some waggish miller, who, after doing his utmost to winnow away the weevils, finding the majority of the little black vermin too snugly ensconced each in his barley or wheat corn, fairly ground them up in despair, and to account for the strange flavor, gave them a name, indicating to willing believers the pleasant calves' foot association of gelatine. Be this as it may, it is certain that the lieges of Great Britain may fairly claim the creature weevil as constituting part of the food of man. Weevils eat wheat, and working men eat weevils, buying bread of "small profits and quick returns." Weevil may be good or may be bad as food of men, but assuredly it must be expensive food, inasmuch as its maintenance while

getting up flesh is costly—in farmer phrase, weevil "eats more than his head is worth."

With regard to animal food, a similar difficulty prevails; it is limited in the term of durability. It is not fit for food while fresh, i. e. tough, and after it has become tender, small is the interval between that and putridity; and, therefore, the public must pay an high price to compensate the dealer for his risk; unless the primitive practice be resorted to of making contract by sound of bell, to ensure the sale of the whole previous to killing.

In all articles of periodical produce, and especially in food, it will be found that the fluctuations in price are great in proportion to the difficulty of preservation. The mass of mankind are conservative and indisposed to take risks. The speculative few must be paid in proportion to their risks. During a personal residence in Spanish America, we observed that the usual price of wheat in harvest time, was half a dollar the *fanega*; but midtime, between harvests, it usually rose to a whole dollar. A rainy season occurred and produced blight, and the maximum price was three dollars. Scarcity and ignorance induced the preservation of the worst wheat for sowing, and the following year, the price rose to twenty dollars. Flour in barrels, then first became an import from the United States into the granary of the Pacific. To the want of efficient granaries was this evil mainly owing, and, as in Ireland, the people resorted to sea-weed in their extremity.

The preservation of food, has, at most periods, been an object, but the usual processes of man have been, for the most part, little in advance of the squirrels and other animals; less than those of the bees, which have an instinctive perception of the true principles, viz: the exclusion of air, which they accomplish by hermetically sealing up their honey-cells. In some cases, this principle is aimed at, but in a clumsy way. Preserved provisions, as meat, fish, soup and milk, are enclosed in hermetically sealed tin cases, and rendered durable for years. The air, in these cases, is excluded by the agency of heat and a par-

tial cooking. The expense of these methods prevents their being more than a luxury. Potted meats are prepared with antiseptics, and the air is excluded by a covering of melted fat. Green fruits and vegetables are enclosed in sealed bottles, from which the air has been driven out partially by heat. Meats, antiseptically treated, are also preserved from the air by enclosing in a bladder or gut, in the form of sausages. Salted meat in brine, is preserved partly antiseptically by the salt, and partly by immersion in liquid brine. Smoked meats are preserved partly antiseptically by the empyreumatic acid, and partly by the watery particles being driven off by heat, so that the meat becomes a kind of glue, and the air is excluded by heat. Dry cakes of glue may be preserved any length of time; but if they be moistened to admit the air, they soon putrify. The charqui or jerked beef of South America, is made into a glue by the heat of the sun, and thus assumes the character of cheese, decomposing by mites. Dried flesh of this kind, mixed with butter or fat, is the pemican of North West America, from which the air is thus excluded. Egyptian mummies have air excluded by bandages.

There are various modes in which grain is preserved, some intentional, some accidentally. What are called brewers' grains or spent malt, the cowkeepers in the neighborhood of London seek to preserve by covering them over in pits. The air is not excluded, and therefore the method is inefficient. What is called mummy wheat, has been preserved by the effectual exclusion of the air. In Spain, wheat is preserved in what are called Silos, i. e. underground pits of peculiar soil, covered in with earth. Wheat thus treated, lasts many years. The French armies were accustomed to hunt for these deposites for subsistence. A flat stone generally covered the opening, and on its removal a quantity of deleterious gas generally rushed out, sometimes killing the opener with asphyxia. In Canada West, hunters and Indians make deposits of Corn and other things in artificial caverns, called Caches, chosen in dry spots and covered over. In some of the internal parts of Spanish America, the common

granary is the skin of an ox taken off entire, and the legs and neck being tied round, it is filled with tightly jammed earth through a hole in the back, while suspended between posts. When dried to a state of parchment, the earth is taken out, and the bloated bag, resembling a huge hipopotamus, is filled with grain, which is thus kept air and vermin proof.

Three conditions are essential to the process of putrefaction, viz: heat, moisture, and still air. With wind, moisture is carried off; with cold, the decomposing process is checked, as may be seen by the carcases of animals that lie through the winter in snowy mountains, and dry up to glue. Without air, everything is locked up, and remains *in statu quo;* as reptiles have been buried for ages in blocks of stone or ancient trees, and then resumed their vital functions unchanged by time.

In direct opposition to these principles, are the granaries of Great Britain and other countries constructed. Their site is generally the bank of a river or the sea side. They are built of many floors at a vast expense. They are provided with many windows, each floor being the heighth of a man, yet not permitting more than twelve to fifteen inches depth of grain on each floor for fear of heating, unless in the case of very old samples. Men are continually employed to turn the grain over, to ventillate it, and clear out the vermin; and the weevil is naturalized in every crevice, as surely as bugs in neglected London beds, or cockroaches in West Indian sugar ships. It is the admission of air that permits this evil, that promotes germination, that permits the existence of rats and mice. *In the exclusion of air, is to be found the remedy.*

The practicalization of this, is neither difficult nor costly; on the contrary, close granaries might be constructed at far less proportional cost, than the existing kind. They might be made under ground as well as above ground, in many cases better. They might be constructed of cast iron like gasometer tanks—or of brick and cement—or of brick and asphalte, like underground water tanks. It is only required that they should be air-tight, and consequently water-tight. A single man-hole at the

top, similar to a steam boiler, is all the opening required, with an air-tight cover. The air pump has long ceased to be a philosophic toy, and has taken its place in the arts as a manufacturer's tool, and no difficulty would exist as to that portion of the mechanism. Now, if we suppose a large cast-iron or brick cylinder sunk in the earth, the bottom being conical and the top domed over, an air-pump adjusted for exhausting the air, and an Archimedean screw pump to discharge the grain, we have the whole apparatus complete. If we provide for *wet* grain, a water pump may be added as to a leaky ship. Suppose, now, a cargo of grain, partly germinating, and containing rats, mice, and weevils, to be shot into this reservoir, the cover put on and luted, and the air-pump at work, the germination would instantly cease, and the animal functions would be suspended. If it be objected that they would revive with the admission of the air, we answer that the air need not be admitted, save to empty the reservoir. If it be contended that the reservoir may be leaky, we answer, so may a ship; and if so, the air-pump must be set to work, just as is the case with a water pump in a leaky ship.

The cost of an underground reservoir, would possibly be more than one above ground, but it has the advantage of occupying space of otherwise little value. One obvious cheapness of this improved granary over those now existing, is, that the whole cubic contents can be rendered available. But many existing structures might be rendered eligible. For example, the railway arches of the Eastern Counties, the Blackwell and the Greenwich. In such cases, the grain would be discharged into them from wagons on the line, in the mode used with coals. Reservoirs might be erected in farm yards, and the grain thrashed out, and carried from the harvest field direct, with the absolute certainty of preserving it at any length of time that might be desired. Or, inasmuch as it is a certain thing that all farms must ultimately communicate with railways, by means of cheap horse-trains, or steam sidings, in order to work to profit, it would be desirable that the granary should be erected at some central railway station, where a steam mill would do the work of

exhausting the air, discharging the grain by Archimedean screw when required, and grinding it into meal.

No better purpose could be found, to which to apply the atmospheric engines and stations of the Croydon Railway, with their existing air pumps. Communicating with all the southern wheat-growing counties of England, and also with the Thames, no spot could be more eligible as a central depot. In connexion with these arrangements, it would be desirable to minimise the cost of transit in every possible way.

The same arrangements that are good on land, are good at sea. Many cargoes of wheat have been abandoned, owing to heat and germination on their passage. Rats, mice and weevils, also, are very destructive. If the vessel were built with metal-lined, air-tight compartments, the air might be exhausted by pump, occasionally trying the pump to ensure against leakage; and thus, even new, undried grain might be carried and delivered across the sea undamaged. Collateral advantages would also be gained; the vessel would be more safe by means of airtight compartments, and also more buoyant. And the same arrangements would be equally available for various kinds of goods subject to damage in transit—such as are hermetically sealed in tin cases, and thus the expense of packages would be saved.

In reservoirs on shore, the air might not merely be pumped *out*; warm air might be pumped *in* to dry damp grain. Water might also be pumped in and out to *cleanse* the grain.

Similar reservoirs or magazines on a smaller scale, might be constructed for butchers or other provision dealers, and meat might be preserved fresh for weeks in the heat of summer, preventing the necessity of waste, or of selling at ruinous low prices; and so with the fish brought to Billingsgate or other markets. On the same principle, there is no doubt that fresh meat, as sea stock, might be carried instead of salt meat, and that fresh provisions might be transported from any part of the world to any other part. Pork, or beef, or mutton, or venison, might be killed in America, and transported into England. Weevily biscuit

would be a traditional commodity, only, in the annals of sailor craft.

"Water-tight compartments," is, at present, the expression for a safe ship. "Air-tight compartments" would be a term expressive of equal safety, and far more general utility. The expense of air-tight joints for the man holes or openings, would be but trifling. By the application of *gutta percha*, a perfect fit might at all times be ensured, with scarcely any expense.

As regards the economy of transport of grain from foreign countries, the process would be as follows: The corn brought down the Mississippi to New Orleans, or by Canal or rail to New York, would be discharged into the air-tight magazines of the vessel. On arriving at Liverpool, or Birkenhead or Harwich, the Archimedean screw pump would discharge the grain into close wagons on a railway on the edge of the quay. These wagons might be rendered measurers of quantity, being all made to hold a given number of quarters; and thus all labor and expense in measuring, would be saved. The wagons so loaded in bulk, and without the expense of sacks, would discharge their contents into reservoirs beneath the sidings, say, for instance, the railway arches of the Eastern Counties. There it might remain secure against all detriment, for any number of years the owner might desire, with the minimum of expense in transit and stowage. The wagons would be constructed with a hatch at top, and a discharge-pipe below.

Lynn is the shipping port of Norfolk, where grain is collected to forward by sea to the markets of Yorkshire and elsewhere. With the granaries before described, in connection with railways, Lynn might become a centre for mills and biscuit manufacture. The government dock yards, communicating with railways, might have similar establishments. There can be little doubt, that with such arrangements the price of food would be far less fluctuating, and that it would become a practicable thing to borrow money on food, as on brandy, or iron, or any other commodity, when once its durability and unchangeability were demonstrated.

The various modes of applying the principle of air-exhausted reservoirs, may be thus summed up.

AS FIXED RESERVOIRS.

1. Granaries for sea ports and dock yards.
2. Ditto, for rivers and canals.
3. Ditto, farms.
4. Granaries for railways.
5. Ditto, for mills and breweries.
6. Reservoirs for butchers.
7. Ditto, for fishmongers.
8. Reservoirs for fruiterers.
9. Ditto, for private dwellings.
10. Ditto, for dairies.
11. Ditto, for Government dock yards.

AS MOVEABLE RESERVOIRS FOR

12. Grain ships.
13. Combustibles in ships.
14. Fresh meat in ships as provisions or cargo.
15. Fruit and vegetable ships.
16. Fish vessels.
17. Damageable goods generally.
18. Canal boats.
19. Railway wagons.
20. Road wagons.

In these simple means will be found an economic and ample security against those fluctuations in the price of food, that really constitute the ground work of the greater part of the miseries of man.

REMARKS.

By excluding MOISTURE, preservation is rendered certain. Buried under or above ground, in tanks or reservoirs, decomposition of grain could only be arrested by a perfect and constant vacuum. Where moisture exists, vapors are generated. What is possible in small cases would not be possible in large reservoirs with a pressure of atmosphere of 15 lbs. to each and every square inch, leaving the practicability out of the

question, the cost and attention which would be required would preclude their general adoption.

In dry climates, like Egypt, Spain, and some portions of South America, grain may be kept in almost any situation, as before it is stored, most of moisture has been absorbed by the atmosphere.

To adapt vessels for carrying grain as stated, would unfit them for any other cargo. Were it not for this, the method would be inexpedient, because of the expense, weight, and uncertainty of the tightness of the reservoirs, and of the attention that would be required to exhaust the vapors generated.

I fully concur with the writer, that the grain warehouses in all countries are badly located and badly constructed for the preservation of bread-stuffs; but they must be located where they can receive and ship with the least possible expense. As grain is now handled, it must be spread thin to prevent total loss; it must be turned often to condense by cold the moisture imbibed from the atmosphere.

If the plans of the writer in the Westminster Review were practicable, and were they adopted, not only would an expense of many hundreds of thousands of pounds have to be resorted to in England alone, but all the property now devoted to storage of breadstuffs would suffer a great depreciation in value.

Most of the grain warehouses now in use at the great grain depots on Lakes Michigan, Erie, and Ontario, and at Albany and New York, are termed "elevating warehouses;" they were adopted eight years since on my recommendation; they have bins which hold from 3 to 5,000 bushels each, and the grain lays in masses from 10 to 15 feet deep. The grain is carried up from vessels or canal boats by steam power, spouted into the bins, and from thence spouted into canal boats or vessels; and it is done with so much facility and so little expense, that the charge is but one cent per bushel for receiving, elevating, weighing in and out, delivering, and the full weight received guaranteed. For this compensation the grain may remain in the bins for 10 days, after which the charge is ½ a cent per bushel per

month. These warehouses vary in capacity from 50,000 to 300,000 bushels. None of them, however, which have not a drying apparatus, are intended for the preservation of grain, but to its temporary storage while in transitu.

For the preservation of fresh meats, fish, and fruit, we have seen in use in different sections of the country, warehouses having a large body of ice stored above the apartments containing the meats, &c.; the temperature maintained is 38° Fahrenheit, which is 7 degrees below that required for decomposition.

By the adoption of my process, preservation of bread-stuffs becomes certain, and the present warehouses would store from five to six times the quantity they now do; the grain could lay from floor to ceiling, and be the better for it; surrounded by thick planks necessary to sustain the pressure, they would prevent the air from coming in contact with the grain, and it would thus be preserved for many years, and an immense deal would be thus saved in the labor of turning it over. *Weevil or any other insect cannot exist, where there is not moisture*, and even if they could, grain when dried becomes too hard to be molested by them.

When grain is ground into flour or meal, and is dried by my process, by packing it into casks its *cohesive properties make it impervious to air, and being divested of internal moisture, vermin cannot exist among it, and from this cause it is susceptible of being kept in any climate an indefinite time.*

This being true, then my process becomes an object of first importance to all nations,—to the densely populated, because the surplus of the years of plenty may be held in reserve for years of scarcity: to the distant grain growing regions, because that their crops may be preserved at home, or while in transitu.

After what has been said on this subject, it would appear to be superfluous to produce any further arguments or proofs to show the necessity of the dealer in breadstuffs (either miller, speculator, forwarder or farmer,) adopting a certain process by which breadstuffs may be preserved. Previous to the past season, no arguments would have prevailed, because a ready mar-

ket for home consumption has been found for our surplus, and what has been injured either in the hands of the miller or the speculator, has been concealed, as far as it could be, so that the reputation of his mill or his credit should not suffer.

The experience of the past year, has shown to the world what our country, yet in its infancy of agricultural productions, is capable of producing. To the heating and souring of breadstuffs, and from the fear of it, must be attributed the severe losses of the past year; without the remedy is applied, this evil must increase with the increase of our surplus. The books of one of the three inspectors of the city of New York, shows that in 1847, he inspected 218,679 bbls. of sour and musty flour. He certifies, that in this amount, he is of opinion, that there was a loss sustained of $250,000.

When it is recollected that no flour that is known to be sour or bad is inspected, what must have been the losses sustained in that city? Boston, Albany, Philadelphia, New Orleans and Baltimore, and several other minor cities, are the depots for flour and grain; in all of these places, great losses are known to have occurred. I have received estimates, varying from $3,000,000 to $5,000,000, from several of the largest dealers in the union, as the supposed annual loss among all classes in the United States, from the chemical changes produced by internal moisture in breadstuffs.

To realize what the increase of our surplus will be in but a few years, I have extracted the following from the last writings of the late Hon. Silas Wright:

"Our country is very wide and very new. It embraces every variety of climate and soil most favorable to agricultural pursuits. It produces already, almost every agricultural staple, and the most important are the ordinary productions of extensive sections of the country, and are now sent to the market in great abundance.

"Yet our agriculture is in its infancy almost everywhere, and at its maturity nowhere. It is believed to be entirely safe to assume, that there is not one single agricultural County in the

whole Union filled up in an agricultural sense—not one such County which has not yet land to be brought into cultivation, and much more land, the cultivation of which, is to be materially improved, before it can be considered as having reached the measure of its capacity for production. If this be true of the best cultivated agricultural county in the Union, how vast is the proportion of those Counties, which have entire townships, and of the States, which have not merely Counties, but entire Districts, yet wholly unpeopled and unreclaimed from the wilderness state?

"When to this broad area of the agricultural field of our country, we add our immense territories, organized and unorganized, who can compute the agricultural capacities of the United States, or fix a limit to the period when our surplus agriculture productions will increase with increasing years and population? Compare the census of 1830 and 1840 with the map of the Union, and witness the increase of population in the new States, which are almost exclusively agricultural, and who can doubt the strong and resistless inclination of our people to this pursuit?

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"Does any one believe, that for generations yet to come, the agricultural operations of the United States are to be circumscribed within narrower comparative limits than the present; or that the agricultural productions of the country are to bear a less ratio to our population and consumption than they do now? I cannot suppose that any citizen, who has given his attention to the considerations which have been suggested, finds himself able to adopt either of these opinions. On the contrary, I think a fair examination must satisfy every mind that our agricultural surplus, for an indefinite future period, must increase much more rapidly than our population and the demand for domestic consumption. This I believe would be true without the efforts of associations such as this, to improve our agriculture. The condition of the country, and the inclination and preference of our population for agricultural pursuits, would render this result

unavoidable; and if this be so, when the impetus given to agricultural production by the improvements of the day; the individual and associated efforts constantly making to push forward these improvements with an accelerated movement; the mass of educated mind turned to scientific researches, in aid of agricultural labor; the dawning of a systematic and universal agricultural education; and the immense bodies of cheap and fresh and fertile lands, which invite the application of an improved agriculture, are added to the account, who can measure the extent or duration of our agricultural surplus, or doubt the soundness of the conclusion that the export trade must exercise a great influence upon the market for the agricultural productions of the country, for a long series of years to come?

"The present surplus of breadstuffs of this country, could not have been presented in a more distinct and interesting aspect than during the present year. A famine in Europe, as widespread as it has been devastating and terrible, has made its demands upon American supplies, not simply to the extent of the ability of the suffering to purchase food, but in superadded appeals to American sympathy, in favor of the destitute and starving. Every call upon our markets has been fully met, and the heart of Europe has been filled with warm and grateful responses to the benevolence of our countrymen, and yet the avenues of Commerce are filled with the productions of American Agriculture. *Surely the consumption of this country is not equal to its Agricultural productions!*"

Estimates on the cost of Producing, Manufacturing, and Transporting Flour and Meal from different sections of the United States to Europe—Different routes of Transportation—Opinions as to the best places for manufacturing Breadstuffs—Advantages of the Atlantic States.

As there can be no doubt of the annual increase of our surplus production, it will be well to define the present cost of producing, and transporting the two great staples of the grain growing States. In the vallies of the Ohio, Scioto, Miami, Wabash, White, Whitewater, Illinois, Kentucky, Cumberland, Tennessee, Missouri, and a portion of the Mississippi rivers, it does not cost (independent of the value of the land,) ten cents per bushel, to produce and gather the crop of Indian Corn. In the best corn districts, the average crop may be stated at 70 bushels per acre. Many instances are known of the yteld of whole fields being 125 bushels to the acre—179 bushels per acre. to my knowledge, has been produced. A large portion of the crop in the interior counties of the western States, is gathered and consumed by cattle and swine; the average price of the grain upon any of the waters named, does not exceed 25 cents per shelled bushel of 56 lbs, and in many locations on the above streams, the average price may be quoted at 15 to 20 cents for corn sufficiently dried by nature, to be termed merchantable. In the gathering season, the price ranges at least 20 per cent. lower, owing to the excess of moisture contained in the grain, and the risk of shipping, and in many cases, the necessity of realizing.

The corn crop never fails on these waters; it may and does vary in amount of production, but this plant, unlike wheat, has no deadly enemies.

The cost of producing wheat is as variable as the soil, the climate, and the different methods used in its cultivation,

and it being only used for human food, its value is so fluctuating that it is hardly possible to affix an average of value. Upon the navigable streams emptying into the Mississippi, the price, in ordinary years, has ranged between 50 and 75 cents per bushel of 60 lbs.

The price of transporting a barrel of flour or corn meal from points on any of the streams mentioned to New Orleans, will not exceed 50 cents per barrel; from New Orleans to Liverpool, freight may be safely calculated at 85 cents per barrel—there need be no charges at New Orleans, as the flat boats, which is the usual means of transport, may discharge into vessels, if put into store, the charge will range from 10 to 15 cents per barrel.

Estimate of the cost of a barrel of 196 lbs. of dried and bolted Corn Meal, delivered in Liverpool, England.

4 bushels of Corn, at 56 lbs. to bushel, is -		224 lbs.
Moisture contained in 4 bushels, say 5½ lbs. to bushel, is - - - -	22 lbs.	
Hull or bran, - - - - - -	6	28
		196 lbs.

Cost of 4 bush. Indian Corn, at 25 cts., is	$1,00	
" barrel, " "	35	
" grinding and drying, - -	20	
Transportation to New Orleans,	50	
Charges at " "	10	
Transportation to Liverpool, -	85	
	$3,00	

Estimate of the cost of a barrel of Dried Wheat Flour, Manufactured on the streams specified.

5 bushels of wheat, at 60 cts., is -	$3,00
Barrel, - - - - - -	35
Grinding and drying, - - - -	25
Transportation to New Orleans, - -	50
Charges at " " - -	10
Transportation to Liverpool, - -	85
	$5,05

Much more allowance may be made for deduction on the estimate on meal than on the flour, as corn is grown in abundance in the whole region, and the business may be carried on to an

extent which would materially lessen the estimate, while the supply of wheat, except at a few prominent points, is limited, and is manufactured with imperfect machinery in small mills in the vicinity where grown.

In the Basin of the Great Lakes, the product of these great staples are more nearly equalized, although wheat may be said to predominate.

Estimate of the cost of a barrel of Dried Corn Meal, manufactured at Toledo, Ohio.

4 bushels of Corn, at 35 cents, is -	$1,40
Barrel, - - - - - - -	30
Grinding and drying, - - - -	25
Transportation to New York, via Buffalo or Oswego. - - - -	75
Charges in New York, - - -	10
Transportation to Liverpool, - - -	50
	$3,20

The tolls on the New York Canals are much less on corn than wheat, but the same on meal and flour, thus offering a bounty to foreign manufactures.

Estimate of the cost of a barrel of Dried Wheat Flour, manufactured at Cleveland, Ohio.

4⅔ bushels of wheat at 75 cents, is -	$3,50
Barrel, - - - - - - -	31
Drying and grinding, - - - -	20
Transportation to New York, - -	75
Charges in " " - - -	10
Transportation to Liverpool, - -	50
	$5,36

The machinery in the best flouring mills, and the facilities for obtaining barrels, together with the amount manufactured, enables the northern millers generally, to manufacture for the difference that will be seen in the estimates.

These estimates show a great difference in favor of purchasing and manufacturing in the valley of the Mississippi, but when it is remembered *the risk* that is encountered in the transportation of perishable products, such as breadstuffs *now are*, through a tropical climate, the insurance, and *the time* that is consumed, it

will be readily understood why a northern route, which is shorter, but more expensive, is preferred. Those great marts of trade and commerce, New York and Boston, are not far removed from the great producing regions of the Great Basin of the Lakes, artificial avenues to transport the surplus of those regions, and to carry to them the wants of trade, are opened, and are being constructed. The two great arteries of the north portion of our continent, the greatest natural avenues in the world, the St. Lawrence and Mississippi, are only used by those who have not access to the avenues of transportation created by man. This is an unnatural state of things, and when the people of the mighty valley of the west shall realize the benefits that will accrue to them of a certain process of preserving their breadstuffs, the surplus production of that valley will seek the course intended by nature.

The obstructions in the outlet from the Basin of the Great Lakes, have been overcome by art, but it has a greater impediment to contend with in the power that controls most of the soil which it traverses, so long as English shipping has the monopoly of free access through it to the ocean, the productions only of Canada will be carried upon its waters.

Its free navigation is now agitated—an opinion of the benefits that will accrue to the inhabitants of the Lake Basin, may be surmised from the following letter of the Hon. Wm. Hamilton Merritt, whose estimates may be relied on, for he has originated, and with an untiring energy has advocated with the People and in Parliament, the construction of all of the great public improvements of Canada.

CLEVELAND, Aug. 14, 1848.

J. R. STAFFORD, ESQ.—Sir:—In reply to your inquiry respecting the prices of freight on a barrel of flour, or of corn meal, from this to Liverpool, via the St. Lawrence, for present prices, must refer you to the forwarders and merchants engaged in business. On future prices, when the Welland Canal and St. Lawrence Canals are finished, so as to admit of a vessel drawing 9 feet 6 inches water, with 5000 barrels of flour, pass-

ing from this to Quebec without a single transshipment, and returning by one continuous canal from tide water to Prescot—at the termination of slack water navigation from Lake Ontario, and from Lake Ontario to Erie—I have no doubt it can and will be conveyed for

Toll on Welland, - - - - -	9 cents,
" St. Lawrence, - - - -	9 "
Freight, - - - - - - -	20 "
	38 cts.,

assuming a fair supply of return freights, this is quoted as an average for navigable parts of the season.

Your ob't. serv't.,

WM. HAMILTON MERRITT.

The freight from Quebec to Liverpool, may be quoted at 60 cents, and the charges at Quebec, at 15 cents per barrel.

Supposing these estimates to be correct, then a barrel of flour

at Cleveland, costing as per estimate, - - - -	$4,06
will be carried to Liverpool for - - - - -	1,13
	$5.19

being a difference in favor of this route over the New York Canal of 17 cents per barrel.

No estimates are made for duties in Great Britain, as they cease on breadstuffs on the 1st March next.

Insurances, in all cases, would be in favor of the New York route; whether that difference, would be equivalent to the interest on the less time taken by the St. Lawrence route, or the cheapness and unobstructed navigation by frosts, but risks of the southern route, I will leave for others to determine.

When the enlargement of the Erie Canal shall be accomplished, then the prices of transportation will be reduced, so as to compete with the St. Lawrence route, as per estimate.

An estimate has been made by the Directors of the Portland and Montreal Rail Road, that flour may be transported from Detroit, Michigan, to Portland, Maine, at 60c. per barrel; from thence to Liverpool, the freight may be quoted at 45 cents.

A Rail Road is being constructed from Ogdensburgh, on the

St. Lawrence, to Boston, and estimates are made for a cheaper delivery of western products in Boston, by this route, than any other.

The New York and Erie Rail Road commences at Dunkirk, on Lake Erie, 45 miles west of Buffalo, and terminates at Piermont, on the Hudson River, about 40 miles north of New York. It is expected by many that this Road will be able to compete with any other avenue for cheapness of transportation. Thus we see a great rivalry between different sections of the country, which has for its purpose the securing the trade of the Great Basin of the Lakes.

The grain which is brought to the cities of New York, Baltimore, Philadelphia and Boston, is either raised upon the seaboard, or the ventures of distant speculators; hence, the markets are very fluctuating, and prices are very frequently at the extremes. The States of North Carolina, Maryland, Virginia, Deleware, Pennsylvania, New Jersey, and New York, produce large quantities of wheat and Indian Corn. It may be well to estimate at what prices corn meal may be manufactured in the above cities. I make no estimate on the manufacture of wheat in those cities, as no criterion can be had because the high price of the offal frequently gives to wheat an extra value.

The price of Corn in		Baltimore, ranges from	45 to 70 cts.
"	"	Philadelphia, - -	45 " 70
"	"	New York, - -	50 " 75
"	"	Boston, - - -	55 " 80

In the following estimate I have adopted medium prices without making an allowance for the value of the offal.

Estimate of a barrel of Dried Corn Meal, manufactured at Baltimore or Philadelphia.

4 bushels Corn, at 55 cents, - - -	$2,20
Drying and grinding, - - - -	30
Barrel, - - - - - -	33
Freight to Liverpool, - - - -	66
	$3,49

Estimate if Manufactured in New York.

4 bushels Corn, at 60 cents, - - -	$2,40
Drying and grinding, - - - -	30
Barrel, - - - - - - -	31
Freight to Liverpool, - - - -	50
	$3,51

Estimate if Manufactured in Boston.

4 bushels Corn, at 62½ cents, - - -	$2,50
Drying and grinding, - - - -	30
Barrel, - - - - - - -	35
Freight to Liverpool, - - - -	50
	$3,65

These estimates show a large per centage in favor of the manufacture in the great corn growing regions of the west, or in other words, they show the difference between rolling or bulk freight; and yet it is my opinion that mills for grinding breadstuffs will succeed better in the large cities than in the interior, for the following reasons:

1st. The surplus products of a country always accumulate in the great commercial depots, which are also the depots for the surplus wealth of the country.

2d. The moneyed wants of the holders of produce, or the fear of depreciation in quality or value, frequently depress prices much below cost of production and carriage.

3d. The facilities by which a stock of grain is obtained, and the ease with which capital is procured upon any article of quick sale, or which is not liable to change in quality.

4th. The daily home demand for either the flour, the meal, or the offals, the latter being of but little value in the interior.

5th. For the home supply, the substitution of sacks, which may be returned, for the barrel, which is a loss.

I have not made any estimates on the transport of grain, from the fact that the data which I have given, may suffice, and that I do not consider it is policy in us to ship the grain, or for foreigners to buy it, for the reasons,

1st. That although the moisture may be expelled from grain,

yet, in a long voyage in bulk or in sack, closely confined in the hold of the vessel, it will again imbibe some moisture, not in usual cases sufficient to generate fermentation, but that which is reabsorbed is the fumes of bilge water, injurious to the grain, and detrimental to health.

2d. That it is desirable to afford our surplus in the best possible order, and at the lowest possible price, so that we may command the markets of the world. This we can do by sending our products as rolling freight, which is always transported and handled enough lower to compensate for its manufacture.

The only argument against this course is, that nations abroad wish the profits of the manufacture.

The grinding of breadstuffs gives less employment to numbers, than any other class of manufactures, and in no country has this class of machinery been brought to the perfection that it has in the grain growing States of this Union; hence no nation can compete with us in furnishing to other nations manufactured breadstuffs.

Large quantities of grain in sacks and bulk are received in New Orleans, Baltimore, New York and Boston; it would be a safe estimate to say that the loss upon the receipts from damage and extra handling, was 10 per cent., and that the fear of loss at certain seasons of the year, occasioned a further depreciation of ten per cent.

The Atlantic States have a decided advantage over the others in the production and sale of their surplus breadstuffs.

1st. In having a home market and quick sales, without the tax of transportation.

2d. In being first into market when there is a demand.

These considerations compensate the farmer living on high priced land, while the prairie farmer living on government lands with superabundant crops, may require many of the necessaries of life, while waiting for a purchaser or a rise of water.

It will be observed that I have given estimates and made observations on the productions, manufacture, and modes of transportation from different sections of the union, without being

biassed in favor of any particular section; my object is to give information. A large portion of the surplus wealth of this country, will be embarked in providing means of transit to and from the different producing and consuming localities, and prices will be governed accordingly, and then eastern capitalists who are the most enterprizing, will the soonest realize profits from the reception of the products, and from supplying the wants of the Great West.

OBSERVATIONS

Upon the conditions upon which Grains and their product have been exported —Difference in the methods of preserving breadstuffs—Chemical effect of moisture in Flour and Meal—Manner of harvesting wheat in the United States—Detailed description of Indian Corn—The manner of harvesting and its subsequent disposal—Difference in the quality of Ceral Grains, produced in different latitudes—Analysis of Indian Corn.

I have, so far, confined my remarks to the value of my invention for the preservation of our surplus breadstuffs for foreign exportation, because I am confident that the increasing population of Europe will require a large share of what we have to spare, not only for human food, but they will require our Indian Corn for the subsistence of their domestic animals. The amount of this grain that they have received and are receiving, is no criterion; the great masses abroad know nothing yet of that noble plant or its product, for they have not yet scarcely received any of it in a state of purity; that which they have received, has been fully appreciated; (see letter of E. W. Andrews & Co.,) when its nutritious properties, as food for man and animal, become generally known, our exports will approach nearer our imports than they now do. As is stated in different parts of this volume, our own internal trade and consumption for human food of Indian Corn, exceeds that of any other grain; but no process has heretofore been invented, by which Corn has been prepared for human consumption—all the kiln dried meal that is manufactured in the United States, is shipped to foreign countries, and not any of it is used or would be used, by our people. Meal dried by my process, is preferred to any other, and where known, is the only kind used. The reasons why meal which has its moisture expelled, is preferable to meal containing moisture, are,

1st. The oxygen of the atmosphere, combines with the moisture contained in the undried meal, and there forms an acid which is deleterious to the health of man and animals, more especially when the meal has been kept several days.

2d. The chemical change produced in the meal from the above cause, soon produces decomposition, and, of course, a total loss.

My process, as will be seen, expels this moisture; no acid effects are produced, and the meal may be kept an indefinite time, if excluded from air and moisture.

The same may be said of flour: why is it that every one wants new flour, made from new wheat? Is it not because when the flour is new, the chemical change has not yet taken place, which, it is known, will? Does not my process extract from the grain, or its produets, some of its nutritious qualities? and has not nature made the grains as they should be eaten, without the interposition of art? These are questions that are sometimes asked, and I answer: nature, or, more properly speaking, Divine Providence has adapted and exactly fitted the food of man, so that a sound body and a sound mind may be sustained. Let us examine how we gather our crops, and whether they have become perfected, and are adapted for use.

In many portions of the grain growing States, the thrashing machine is carried into the harvest field; the new and unperfected grain is carried thence to the mill or warehouse, that it may be carried to an eastern or southern market. It has not been stacked, it has not taken the *mow sweat*, it is not left until it has become the perfect article fitted for human food, when, as in some cases, it becomes so, and is taken to the miller, it is too dry to grind, the hull will grind fine, and the flour becomes specky. It is mixed with other samples containing moisture, so that the hull may be cleared entirely from it, that reasonable beings may be fed upon the interior, which supports an existence, while the constituents of the grain, which forms bones and muscle, are fit food only for domestic animals. Do we follow the dictate of either nature or reason in regard to the portions of the grain of wheat that we consume?

How is it in regard to the gathering and disposition of the crop of Indian Corn? This grain, though common, is not generally understood; therefore, I deem it necessary to give a description of it in detail.

If we observe this plant, while growing, we find that the seed is more carefully protected than any other vegetable production used by man or animals, as food. The reason for this must be that it is either the most liable to injury, or it is the most valuable food that Divine Providence has granted for the uses of man or animals. Both of these propositions are true. The usual time of planting is in April; it is planted about 3 feet apart, 5 stalks to a hill; there are from 2 to 5 ears to a stalk, each ear has from 9 to 12 layers of fine fibrous matter, termed husks, which reach nearly around the ear; the inner layers are extremely fine and silk like; the ears are attached to the stalk, by a stem from three to 5 inches long, terminating at the basis of the ear in a large bulb, this stem has several joints; from the place on the cob that the grain is to occupy, there are many silken fibres which protrude from the top of the husks, and hang pendant about 3 inches—these fibres are known as the silk of corn. On the top of the stalk are the flowers, which, at a particular time, fall upon the silk and impregnates it, which produces the grain; while the grain is being developed, the ear stands nearly upright, as soon as the vitality of the stalk ceases, the ear begins to turn downwards; (permitted to do so by the joints in the stem) as soon as this occurs, the husks are thrown from immediate contact with the ear, the large bulb at the base of the ear parts with its moisture by gravitation through the pith of the cob, thence into the grain, which retains that which is essential to its nutriment, and the balance is passed off through the grain by evaporation,—the husk, in the meanwhile, protects the ear from the dews and rains.

To prepare the grain, it is necessary that it should either remain in the field on the stalk, during the winter, or be so housed in the ear or on the stalk, that the process of perfecting it, by the evaporation of its moisture, may continue—all seeds take

care of themselves, and when perfected, leave the parent stem. How is it with the gathering and subsequent disposal of this crop, in the great producing States? It is husked and gathered in October and November, placed in large masses into cribs, where evaporation is nearly, or quite suspended. If not carried to market in the ear, it is shelled by the tread of horses, or by beating it with clubs on a slab frame, or by machines—containing from 15 to 20 per cent. of its weight in moisture, it is exported, to be subjected, in most cases, to fermentation, to the attacks of weevil and subsequent decomposition.

There is a great difference in the qualities of ceral grains, produced in the extremes of latitude. It is generally known that southern wheat makes *more loaves of bread* than northern, because it contains more gluten, and we find that northern wheat contains more starch. The starch produces animal heat, and gluten contains nitrogen, which is a substitute, in part, for animal food; thus we see an adaptation of means to an end; those who live in a rigorous climate, require that their food should give them warmth, while those who live in a warm climate, require a nutriment divested of heating qualities.

By reference to a letter of E. W. Andrews & Co., it will be seen that northern flour contains from 16 to 20 lbs. of moisture to the barrel; this moisture acts on the flour, and when exposed to heat, it readily becomes acid. if it does not sour it becomes stale, and equally unfitted for human food; there being less moisture in southern wheat, and less starch, it does not become sour, but the moisture acts upon and decomposes the gluten, producing an oiliness which renders it wholly unfit for human food; this effect, from the amount of moisture contained in the flour, is not produced as rapidly as souring, hence, southern flour may be carried to southern climes for immediate consumption. —Flour that has passed through the ordeal of inspection, is much more susceptible to change, than that which has not been subjected to the "law of custom, if not of State." The manner in which flour is inspected, is to bore a hole about an inch in diameter, in one head of the barrel, then a tryer of

goodly capacity and full length of the barrel is inserted, generally twice, to make sure of the quality—the flour extracted is a *perquisite* of the inspector. The flour, being tightly packed, has one or two apertures through it from head to head of the barrel and the hole being imperfectly closed, air has free admission: when it is known what effect air and moisture combined has upon vegetable matter, the evil likely to accrue, may be imagined.

I consider it very essential, that the different kinds of grain growing in different portions of our Union, should undergo an analysis, that it might be known which varieties were best adapted to the uses of domestic economy. I suggested the importance of a work of this kind to Prof. Henry, Sec'y. of the Smithsonian Institute, at Washington. An analysis of all kinds of vegetables used as food, and taken from different sections of the country, is now being made, under his directions, which, he informs me, will take two years to complete.

Below will be found an analysis of Indian Corn, by M. Payne, which will give an idea of its nutritious and fattening properties. Different varieties, will, of course, slightly differ in their component parts.

In 100 parts of dried Indian corn, are contained the following amounts of different ingredients: —

Starch,	28.40
Nitrogenized Matter,	4.80
Fat Matter, (Oil),	35.60
Coloring Matter,	20
Cellular Tissue,	20.00
Dextrine,	2.00
Various Salts,	7.20
Loss,	1.80
	100.00

STEAM AND WATER POWER,

As applied to the manufacture of Grain—Marine Mills at Cleveland—Mills in New York and Boston—Opinions on Milling.

Mills for the manufacture of breadstuffs in the United States, are propelled by either water or steam power. There are but few steam mills, excepting in the valley of the Mississippi, and in the valleys of its tributaries; the fuel used is, principally bituminous coal. In the mills of not very recent erection, from 1 to 1¼ bushels of coal is consumed to the manufacture of a barrel of flour, and the amount manufactured in these mills, does not average more than 30 bbls. to a pair of mill stones per 24 hours. Within the past 10 years, more improvement has been made in machinery and applications of power to milling, than had been previously made in a century. Recently constructed mills at the north, now average their 100 barrels per 24 hours, to the pair of 4½ feet French Burr Stones. The cost of any manufactured article, depends solely upon the increased amount that can be manufactured within a given time. A mill of 4 run can now manufacture 300 barrels (allowing one to be idle, or in process of sharpening,) with no additional labor except packers, hence the cost is materially reduced. The daily expenses of a water mill may be quoted at, annual water rent, $500; 3 millers, $1,200, packers and other labor, $1000, interest on investment of $25,000 at 10 per cent, $2,500, insurances and contingencies, $800, in all, 6,000. No estimate should be made for running more than 200 days in the year, on account of the scarcity of grain, high or low water, and occasional repairs—the product would be 60,000 barrels, and the cost of manufacture 10 cents per barrel. If any item of expenses can be reduced, or the mill be kept running a longer period, the cost per barrel will be proportionably reduced.

The improvements which are constantly being made upon the steam engine, but more particularly upon the steam boiler, together with the simplification of milling machinery, will bring steam power into general use in a few years, in the districts where water power is limited. All the streams in the settled parts of the United States are diminishing, excepting those whose sources are mountain springs.

The best and cheapest running mill, propelled by steam, that I have seen, (and I have examined a great number between New York and New Orleans,) is the Marine Mills, in the City of Cleveland, owned by Messrs. S. R. Hutchinson & Co. They are situated upon the bank of the river, and have a warehouse attached with an independent frame, which has storage capacity for 75,000 bushels of grain. The grain is elevated from boats by a sett of elevators, by steam power, and are capable of elevating 2000 bushels per hour, while all the milling machinery is in motion. The mill has 5 pairs of 4½ Burr Stones, which are propelled by two high pressure steam engines, (the kind in universal use in the west, while those in the east are, mostly, low pressure. 125 bushels bituminous coal (costing 8 cents per bushel,) is consumed in 24 hours, manufacturing 400 barrels of flour on 4 pairs of stones. Mr. Hutchinson is part owner, also, of the Cleveland City Mills, which are propelled by the waste water of the canal, and which manufacture about 300 barrels per day. He informs me that the advantages of location of the steam mills, together with the increased amount of flour manufactured per 24 hours, gives to the steam mill a small advantage, in cost of manufacturing, over the water mill.

There are three large steam flouring mills in the vicinity of New York. I am informed by the proprietor of one of them, that expense of fuel (anthracite coal) is 7 to 9 cts. per bbl.

It is stated that the Steam Mill Co. in Boston, manufacture for 30 cts. per bbl., all expenses paid, including bbls. (*Query.*—Are not the barrels second-hand, costing 20 cts. each)? This mill has 8 pairs of 4½ ft. stones, with a large active capital, which enables them to make a quality of flour superior to com-

mon brands, and for which they are remunerated in price and profit.

The yield of superfine flour depends upon amount and adaptation of the machinery. The best mills now obtain a barrel of superfine flour, (N. Y. inspection), from 4¼ bushels of wheat, that weighs 60 lbs. to the measured bushel. With the average of good mills and of wheat, it may be stated at 4½ bushels, while the inferior mills require 5 bushels to make the barrel.

In places where grain accumulates, milling may be pursued by steam or water power, as a safe and profitable manufacturing business. The prices being fluctuating, the tendency of the miller is to speculate, when they do have firmness enough to remain idle until they can work at a profit, or when, in good times, they are content to work for others at milling profits, they invariably succeed; as to reverse operations the universal opinions of the hazard of the trade, is sufficient confirmation as to the fate of speculating millers.

A short Chapter, for the consideration of Millers.

If I am mistaken in the theory that grain should be dried perfectly by nature and then manufactured, and for the reason that the crops are not well secured and matured that this end cannot be attained, and if I am mistaken in saying that flour from new wheat is much more liable to change than from drier grain, and if it be no object to the miller, the consignee, the consumer, or shipper, or either of them, to have the moisture excluded, *but that the reverse is the case,—then the miller may use my invention as a cooler, and instead of using steam, use a fan and blow a current of cold air through the cylinder; the moisture will be condensed, remain in the flour, and a present gain be effected.* But being set up as a drying apparatus, and the machinery so arranged that the flour must pass over the dryer, when in use for summer grinding on dry wheat, no steam need be admitted; then it acts as a cooler in addition to the hopper boy.

When steam is used, but little heat is necessary for drying flour; it is increased but little beyond the heat generated by the friction of grinding; the continual changes of surface, together with the perfect ventilation afforded during its passage over the dryer, creates a rapid expulsion of moisture.

There is one fact that no miller has been able to satisfactorily account for;—why it is that there are some barrels of flour in a lot that has been ground at one time from same quality of wheat that *will not make good bread*, although put in same kind of barrels, and why some of the barrels of flour *in the same lot become sour*, while the balance remains sweet until sold? I am of opinion that the contents of the barrels that first change, have been packed from the surface flour in the packing chest after it has laid a few hours; the effect has not been produced wholly by

the absorption of moisture from the atmosphere while in that condition, but by contact with air, the chemical effect of which I have explained, when referring to changes in corn meal and flour, (see page 43,) the whole mass would be equally affected while the flour was in the hopper boy, were it not that the heat of the flour while there, caused evaporation instead of absorption.

By drying the flour, you obtain a greater proportionate yield; it bolts freer, and there is less adhesion of flour to the offal, for the friction of its passage over the dryer scours the bran, and with the aid of a "*duster*," the offal may be *perfectly cleaned*," while without drying the "duster" is of but little value, particularly for damp grain.

The farther south wheat is grown, the less amount of moisture it contains; the experiments made on northern wheat, show there is contained in a barrel of flour from 16 to 20 lbs. of moisture; I think that the average should not be stated over from 12 to 16 lbs. For shipments of flour or meal to warm or humid climates, or for whaling or navy purposes, it is not only necessary to expel the moisture, but to render the package impervious to moisture by painting or otherwise, closing the pores of the wood; when thus prepared, (which adds but a trifle to the expense,) time or climate cannot effect it.

By contact of air with the moisture contained in flour, worms are generated in flour on long voyages—being always first produced at the chimes; the cause is evident.

Much of the grain used is too damp to grind well, but by passing it over the dryer, a portion of its moisture may be expelled.

It will not require any argument to prove to the miller that the drier the flour is, the more perceptible will be the "feel," and as it is the roundness which determines its quality, the miller can appreciate its value.

The effect produced upon wheat flour by the expulsion of its moisture, is to enhance its value for making bread; it, of course, reabsorbs the moisture which has been expelled, in addition to

that which is absorbed by undried flour, and when made into dough, it rises quicker and lighter.

The question is often asked of the Patentee, how do you know that the flour or meal is dry, if the article is not changed in color, quality, or flavor? The answer is, that a cylinder of a given length, under a given quantity of steam that will dry the product of grain, so damp that it will just grind, will always dry the product of grain that contains less moisture, and its remaining on the cylinder a longer time is no injury to it. To first test the capacity of the cylinder, a given amount, say 100 bushels of grain is ground, the flour or meal is passed over the cylinder, it is then weighed and again passed over; if any loss of weight occurs, it shows that the first passage was not sufficient. One test of a cylinder is sufficient for all time, the heat that a given pressure of steam gives, is the same in any climate, the inclinations and revolutions of the cylinder being the same, the result must always be the same, the absorption of the vapor disengaged by the atmosphere may have a different effect in a small degree at different times in damp or dry weather.

In drying Corn Meal, there is a sure test of dryness always apparent; the passage of the meal many times over the Dryer, produces positive electricity by the friction of the particles, which is plainly developed when it is conducted into the packing chest; its appearance then resembles iron filings on a magnet; was there any moisture present, it would serve as a conductor of the electricity; this effect is soon lost by its coming into contact with conductors, such as the barrel or the atmosphere.

To the Consignees of Breadstuffs.

It might be well to inquire whether it was not an object of great importance to the Commission Merchant to have introduced a process which would insure breadstuffs against change in quality—the accumulating surplus of the country must be held by them; if it is to remain a perishable article, they must be the losers in the end, if otherwise, they must be the gainers, if this is sound logic, an interest manifested by them will materially aid the cause I am advocating. I do not profess to be disinterested in the result; my interest may be considered, if it is thought best, to be wholly pecuniary; admitting it is so, then I wish aid from those who are as deeply interested as myself. A suggestion from that class of merchants, who, in fact, affix prices, who make and unmake the manufacturer, who, as a body, control the majority of the productive wealth of the Union, I appeal to to urge upon the miller, the producer, the shipper, and the dealer in breadstuffs, either manufactured or in the grain, to at once adopt a method that will prevent damage or decay.

If my process can be superceded in either its compactness, its simplicity of construction, its cheapness, its economy of the use of heat, or in the small amount of power required for its operation, or in its not requiring a superintendent, or even a previous experience for drying either the grain or its product, then let the better process be recommended.

OTHER USES TO WHICH MY INVENTION MAY BE APPLIED.

The changes which flour undergoes is first acidity, which only effects the moisture; if it remains in this state long, the starch is effected and the flour cakes; while then, it is in the first stage of souring, flour may be restored for a short time by grinding it over with wheat, the acidity is evaporated and absorbed by the offal; *by a passage over the dryer, acid flour may be permanently restored.*

If used by Linseed Oil manufacturers, by keeping the meal on till dried, it enables them to heat and dry the meal, without scorching or discoloring the oil.

If in use in a district where Garlic abounds, it may be expelled from the wheat by passing the wheat over the dryer, the bulb of the garlic is tender, its principal contents is moisture, the heat acting on it expands and bursts it, the free ventillation carries off the vapor, wheat being a denser body is not acted on to any injurious degree by the heat necessary to carry off the fumes and vapor of the garlic.

Wheat, Corn or Rice that is liable to be attacked by the weevil, may be rendered impervious to this destructive insect, if passed over the dryer; if the germ of the weevil is present, the heat destroys it; if not, the wheat, corn or rice has become too hard for its attack.

From the American Agriculturist for August.

ADULTERATION OF FOOD.

Wheat Flour.—The principal substances employed in the adulteration of flour, are potato starch, bean, pea, and Indian Corn meal, rye flour, chalk, bone earth, (burnt bones) powdered flints, plaster of Paris, and damaged, or inferior kinds of wheaten flour.

One of the simplest methods of detecting flour adulterated with potato starch, is by its weight or specific gravity—thus, a vessel which will hold one pound of good wheat flour, will contain about a pound and a half of potato starch; hence, the amount of adulteration can be estimated to a certain extent.

If a small quantity of boiling hot water be poured upon the flour in which pea meal is present, the odor of peas will be detected; if bean flour, that of beans. Bean meal also imparts a rose-colored tinge to bread adulterated with it.

Rye flour added to wheaten flour, gives it such a decided taste that the fraud is readily detected. The same may be said of Indian meal.

Bread.—The adulteration of bread is often carried to a fearful extent. Not only is the flour from which it is made, falsified by old and damaged grain, and other substances just named in the adulteration of flour, but frequently alum, carbonate of ammonia, carbonate of magnesia, and common bar soap are added to disguise, or improve some bad quality in the flour, or to increase the weight. Bread is also sometimes adulterated with blue vitriol, (sulphate of copper,) white copperas, (sulphate of

zinc,) both of which are highly poisonous, carbonate of potash, plaster of Paris, and pipe clay.

The practice of introducing boiled potatoes into bread, is very common with some bakers. In this there is nothing unwholesome; in fact, the bread is more palatable, but it is a decided fraud; for the bread made in this manner is not so nourishing as wheaten bread, and is made far cheaper than if flour alone were used; hence, it should not sell for the same price. Much of the bread made with potatoes is not so nourishing, by at least 20 per cent., as that of wheaten flour.

Alum is employed for the purpose of working up inferior kinds of flour; if omitted, the bread has a slight yellowish-grey hue, as may often be seen in what is called "home-made bread," in private families. Such bread remains longer moist than that made with alum, yet it is not so light and full of "eyes," nor so porous, and it has also a different taste.

The quantity of alum necessary to produce the required whiteness and porosity in bread, depends entirely on the genuineness of the flour, and the quality of the grain from which it is obtained. The smallest quantity of alum that can be employed in producing a seemingly good bread, from a bad flour, is stated to be about six grains to each pound of flour; but the quantity generally used is believed to be much more.

Markham, in his "Considerations on the ingredients used in the Adulteration of Flour and Bread," states that, in making five bushels of flour into bread, there are added 8 oz. of alum, 4 lbs. of salt, and half a gallon of yeast, mixed with about three gallons of water.

Although alum in bread, is not so injurious as some of the materials to be hereafter treated of, yet its daily use is apt to disorder the proper functions of the stomach, and produce costiveness and other inconveniences, more especially with persons having weak constitutions. Its use, therefore, is much to be condemned, more especially as it is employed to disguise the bad qualities of the flour.

Carbonate of ammonia (volatile sal ammoniac, or smelling

salts,) is employed by fraudulent bakers, in order to produce light and porous bread from unwholesome and bad flour, termed "sour." Thus a material, which, in itself, is perfectly harmless, is made use of by the baker as a mask for fraud. This salt, which chiefly becomes converted into a gaseous state, during the operation of baking, causes the dough to swell up into air bubbles, rendering the bread light and porous, as though it were made of superior flour.

Carbonate of magnesia of the shops, when mixed with inferior kinds of flour, will apparently produce bread of a good quality. The loaves made with it, rise well in the oven, and after being baked, they are light, spungy, and keep well. In cases where new flour is of an indifferent quality, from 20 to 30 grains of this carbonate to a pound, when added, will considerably improve the taste and appearance of the bread. When the flour is of the worst quality, 40 grains of magnesia to a pound, seems necessary to produce the same effect.

It has been stated, that not the slightest danger can be apprehended from the use of so innocent a substance as carbonate of magnesia in the manufacture of bread. This, however, is a mistake; for it is a well ascertained fact, that the daily use of the common magnesia of shops, induces the formation of the most dangerous and painful calculi. So that this species of admixture is to be most energetically condemned, not only on account of the specific action of the substance employed, but also because, by its means an inferior flour can be used.

But the most deadly fraud practiced in the manufacture of bread, consists in the introduction of sulphate of copper (blue copperas,) when the flour used, is obtained from bad grain. If the bread does not rise well, a little blue copperas obviates the inconvenience; it also causes the bread to retain much more water. The quantity generally employed is very small, say, about one ounce of the copperas dissolved in a quart of water, a wine glass of which is sufficient for 175 lbs of flour. Kuhlmann, Ure's Dictionary, deduces from a series of experiments in baking, with various small quantities of copperas, that this

salt exercises an extremely energetic action upon the fermentation and rising of dough, even when not above 1-70000th part of the weight of the bread employed, or one grain of the copperas for 10 lbs. of bread. If more of the copperas be added, the bread becomes moist, less white, and acquires a peculiarly disagreeable smell, like that of leaven.

The sulphate of zinc (white copperas) is also sometimes employed in the manufacture of bread, for the same purpose as the sulphate of copper, the effects of which we have just described, but it does not act in so energetic a manner. It is equally poisonous, however, and is as much to be dreaded.

Carbonate and bi-carbonate of potash, (pearlash and saleratus) are doubtless, employed, in bread-making, not only to destroy the sourness in the flour or dough, but in some cases, for the purpose of bringing the bread into such a condition that it will retain moisture for a considerable time; which is, to the baker, a great advantage. The use of these salts has no injurious effects on the bread; yet, if added with fraudulent intent, cannot be regarded otherwise than wrong.

Common bar soap is sometimes added, to produce lightness and porosity in bread, as well as to make it short and brittle. This is a filthy fraud, the perpetrators of which should be severely punished.

Extracts from the Report of the Comm'r of Patents.

Production of cereal grains in the United States in 1847—*Consumption and surplus for exportation—Demands of foreign countries—Foreign country rivals of the United States—Miscellaneous Tables.*

It is proposed to submit a few facts and considerations, in as condensed a form as possible, in relation to the subjects above enumerated. Precise accuracy is not promised; the nature of the enquiries not admitting of it. Approximation to the truth only is aimed at; and that, it is believed, has been attained. If we have accomplished what we have attempted, our statements and estimates will afford interesting matter for reflection not only to the agriculturist, but the economist and statesman.

I.—*Quantity of the different grains produced in the U. States in* 1847.

The following is the amount of the different kinds of grain produced in the United States in 1847, according to the estimate contained in the table preceding the agricultural report of this office of the present year, viz:

Breadstuffs.	Bushels.	Total Bushels.
Indian corn or maize,	539,350,000	
Wheat,	114,245,500	
Rye,	29,222,700	
Buckwheat,	11,673,500	
		694,491,700
Grain not used for breadstuffs.		
Oats	167,867,000	
Barley,	5,649,950	
		173,516,950
Total,		868,008,650

Other articles of food.

Potatoes, ...100,950,000 bushels.
Beans and Peas,..... 50,000,000 "
Rice, ...103,640,590 pounds.
Estimated population, 20,746,400.

II.—*Amount of the grains used for food, consumed in the United States, showing surplus left for exportation.*

In estimating the domestic consumption of grains in the United States during the present year, we begin, first, with the quantity of each kind used for seed. And in relation to this item of consumption, it is proper to remark, that we have taken for the basis of our calculations, the estimates of intelligent practical agriculturists, residing in different parts of the Union, to whom we have personally applied for information. Making due allowance for different localities, soils and climates, it is believed, they may be relied upon as very nearly accurate:

Varieties.	Whole quantity raised. Bushels.	Quantity used for seed. Bushels.	Amount after deducting seed. Bushels.
Indian corn or maize,	539,350,000	6,000,000	533,350,000
Wheat,	114,245,500	11,424,550	102,820,950
Rye,	29,222,700	3,652,587	25,570,113
Buckwheat,	11,673,500	723,343	10,950,157
	694,491,700	21,800,480	672,691,220

NOTE.—In this estimate, we have allowed a gross amount for the seed used in the cultivation of Indian corn. For wheat we have allowed in the proportion of one bushel of seed to ten bushels of grain produced. Of rye, one bushel to eight, and of buckwheat one bushel to sixteen. These proportions of seed to the quantities produced, are greater than those allowed by the statistical writers of France, for the crops of that country, and less than those allowed in England.

As oats are not used for human food in this country, we have not included that crop in the table above. The proportion, however of seed, to the quantity produced, is about one bushel to twenty. Thus, after deducting from the crops of the various grains used for breadstuffs in the United States, in 1847, the quantity used for seed, 672,791,220 bushels remain for the

use of men and animals, and for exportation to foreign countries.

In estimating the consumption of breadstuffs, English and French writers usually allow five bushels of wheat to each individual. In this country, Indian corn enters largely into the consumption of nearly every class of the community. It is the principal food of the slave population, and is consumed in much greater proportion than wheat, by the agricultural population of the New England states. The general use, therefore, of Indian corn, in the United States, as an article of human food, very much reduces the quantity of wheat consumed.

Another cause which tends to diminish the quantity of breadstuffs consumed by the people of the United States, is, the large amount of animal food consumed by them, which can easily be obtained, and which forms a large item in the consumption of the population of the Union, not excepting the slave population. Making an allowance for the use of Indian Corn and animal food, it will appear that the quantity of wheat consumed by the people of the United States is much less, in proportion, than the quantity consumed by the people of other civilized countries. We do not believe it will exceed three bushels for each individual of the whole population of the Union, free and slave. As the slaves consume but very little wheat, of course, the quantity for each white person would be greater. Below is a table presenting estimates of the quantities of wheat and corn consumed by the people of the United States, based upon two ratios of calculation; first, upon the allowance of three bushels of wheat and five of corn for each individual of the whole population; and second, upon the allowance of three and a half bushels of wheat to each person, excluding the slaves.

On these bases of calculation, the table also shows the surpluses and deficiencies of each state and territory in the Union, above or below the consumption of its population.

Table exhibiting the estimated population of each State and Territory of the Union in 1847, *the number of bushels of wheat and Indian corn produced in each, the quantity of wheat consumed for food, allowing three bushels to each person: also the quantity consumed by the free population, allowing three and a half bushels to each person; also the quantity of Indian corn consumed by the whole population, allowing five bushels to each person; together with the deficiency and excess, under or over the quantity of each kind of grain produced in each State or Territory.*

States and Territories.	Proportion of whites by census of 1840.	Estimated population in 1847.	No. of bushels of wheat produced.	No. bu. of wheat cons'md, all'w'g 3 bu to each per.	Excess.	Deficiency.
Maine,	.....	600,000	890,000	1,800,000	.....	910,000
New Hampshire,	.....	300,000	610,000	900,000	.....	290,000
Massachusetts,	.....	850,000	256,000	2,550,000	.....	2,294,000
Rhode Island,	.....	130,000	4.500	390,000	.....	385,500
Connecticut,	.....	330,000	125,000	990,000	.....	865,000
Vermont,	.....	302,000	664,000	906,000	.....	242,000
New York,	.....	2,780,000	14,500,000	8,340,000	6,160,000	.....
New Jersey,	.....	416,000	1,100,000	1,248,000	.....	148,000
Pennsylvania,	.....	2,125,000	14,150,000	6,375,000	7,775,000	.....
Delaware,	.....	80,000	410,000	240,000	170,000	.....
Maryland,	— 4-5	495,000	4,960,000	1,485,000	3,475,000	.....
Virginia,	— 2-3	1,270,000	12,000,000	3,810,000	8,190,000	.....
North Carolina,	— 2-3	765,000	2,350,000	2,295,000	55,000	.....
South Carolina,	— 3-7	605,000	1,300,000	1,815,000	.....	515,000
Georgia,	§ 1-2	800,000	1,950,000	2,400,000	.....	450,000
Alabama,	§ 3-5	690,000	1,200,000	2,070,000	.....	870,000
Mississippi,	§ 4-7	640,000	500,000	1,920,000	.....	1,420,000
Louisiana,	§ 1-2	470,000	.....	1,410,000	.....	1,410,000
Tennessee,	§ 3-4	950,000	8,750,000	2,850,000	5,900,000	.....
Kentucky,	— 3-4	855,000	6,000,000	2,565,000	3,435,000	.....
Ohio,	.....	1,850,000	16,800,000	5,550,000	11,250,000	.....
Indiana	.....	960,000	7,500,000	2,880,000	4,620,000	.....
Illinois,	.....	735,000	4,900,000	2,205,000	2,695,000	.....

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Missouri,	— 6-7	600,000	1,750,000	1,800,000	.....	50,000
Arkansas,	§ 3-4	152,400	200,000	457,200	.....	257,200
Michigan,	.....	370,000	8,000,000	1,110,000	6,890,000	.....
Florida,	§ 1-2	75,000	.....	225,000	.....	225,000
Wisconsin,	.....	215,000	1,200,000	645,000	555,000	.....
Iowa,	.....	130,000	1,000,000	390,000	610,000	.....
Texas,	— 6-7	140,000	1,110,000	420,000	690,000	.....
District of Columbia,	§ 9-10	46,000	16,000	138,000	.....	122,000
Oregon,	.....	20,090	50,000	60,000	.....	10,000
		20,746,400	114,245,500	62,239,200	62,470,000	10,463,700

TABLE—*Continued.*

States and Territories.	No. bush. of wheat cons'd, allow'g 3½ to each free per.	Excess.	Deficiency.	No. of bushels of corn produced.	No. bus. corn consum'd, allowing 5 to each person.	Excess.	Deficiency.
Maine,	2,100,000	.....	1,210,000	2,890,000	3,000,000	.....	110,000
New Hampshire,	1,050,000	.....	440,000	2,280,000	1,500,000	780,000	.....
Massachusetts,	2,975,000	.....	2,719,000	3,410,000	4,250,000	.....	840,000
Rhode Island,	455,000	.....	450,000	800,000	650,000	150,000	.....
Connecticut,	1,155,000	.....	1,030,000	3180.000	1,650,000	1,530,000	.....
Vermont,	1,057,000	.....	393,000	2,100,000	1,510,000	590,000	.....
New York,	9,730,000	4,770,000	.....	16,000,000	13,900,000	2,100,000	.....
New Jersey,	1,456,000	.....	356,000	8,000,000	2,080,000	5,920,000	.....
Pennsylvania,	7,437,500	6,712,000	.....	20,200,000	10,625,000	9,575,000	.....
Delaware,	280,000	130,000	.....	3,620,000	400,000	3,220,000	.....
Maryland,	1,386,000	3,574,000	.....	8,300,000	2,475,000	5,825,000	.....
Virginia,	2,963,000	9,036,669	.....	36,500,000	6,350,000	30,150,000	.....
North Carolina,	1,785,000	565,000	.....	25,000,000	3,825,000	21,175,000	.....
South Carolina,	907,494	392,506	.....	10,600,000	3,025,000	7,575,000	.....
Georgia,	1,400,000	550,000	.....	25,000,000	4.000,000	21,000,000	.....

(*Continued on next page*).

Alabama,	1,449,000	.....	249,000	26,000,000	3,450,000	22,550,000	.....
Mississippi	1,279,999	.....	779,999	16,000,000	3,200,000	12,800,0 0	.....
Louisiana,	822,500	.....	822,500	9,000,000	2,350,000	6,650,000	.....
Tennessee,	2,493,750	6,256,250	.....	74,000,000	4,750,000	69,250,000	.....
Kentucky,	2,244,375	3 755,625	.....	62,000,000	4,275,000	57,725,000	.....
Ohio,	6,475,000	10,325,000	.....	66,000,000	9,250,000	56,750,000	.....
Indiana,	3,360,000	4,140,000	.....	38,000,000	4,800,000	33,200,000	.....
Illinois,	2,572,500	2,327,500	.....	33,000,000	3,685,000	29,315,000	.....
Missouri,	1,799,997½	.....	49,997½	25,000,000	3,000,000	22,000,000	.....
Arkansas,	400,050	.....	200,050	7,000,000	762,000	6,238,000	.....
Michigan,	1,295,000	6,705,000	.....	6,500,000	1,850,000	4,650,000	.....
Florida,	131,250	.....	131,250	1,000,000	375,000	625,000	.....
Wisconsin,	752,50)	447,500	.....	1,000,000	1,075,000	.....	75,000
Iowa,	455,000	545,000	.....	2,900,000	650,000	2,850,000	.....
Texas,	420,000	690,000	.....	1,500.000	700,000	800,000	.....
District of Columbia,	144,900	.....	128,900	45,000	230,000	.....	185,000
Oregon,	70,000	.....	20,000	525,000	100,000	425,000	.....
	62,303,146½	60,922,550	8,980,196½	537.350,000	103,732,000	433,228,000	1,210,000

NOTE.—In the States marked thus (—) the free population is less to the slaves than the proportions named; and in the States marked thus (§) it is greater. For example, in Maryland the proportion of free to slave is less than four-fifths; and in Georgia it is more than one-half.

It appears from the table above, that the quantity of wheat consumed by the people of the United States, allowing three bushels to each individual, is 62,239,200 bushels, or three and a half bushels for each white person, 62,303,146½ bushels; and of corn, allowing 5 bushels to each individual, 103,732,000. This estimate gives eight bushels of grain to each person. To be liberal in the allowance for domestic consumption (our purpose being mainly to show the amount which may be left for exportation,) we will add half a bushel of rye to each person, and 6,000,000 bushels of buck-wheat to the whole population. Eight and three-fourth bushels of grain, in addition to the animal food consumed, without reckoning beans, peas, and other vegetables and fruits, will be ample allowance for the sustenance of each individual of the population of the United States for one year.

But large quantities of grain are consumed by cattle, horses, and swine. In the absence of any satisfactory data, the quantity consumed by animals, must be mainly a matter of conjecture. Yet we have some facts upon which we can proceed in our calculations.

If the estimate of the population of the United States for 1847, submitted in the tabular estimate of the crops accompanying the agricultural report, be correct, it will appear that the population of the Union has increased nearly 22 per cent. since the census of 1840. As there has been, during the last seven years, no particular cause operating in this country to check production and accelerate consumption, it may be pretty safely assumed that property, of all kinds, has increased in the same ratio of the increase of population—that is, 22 per cent. since 1840. Assuming the increase of 22 per cent. the following estimate of the number of horses and mules, neat cattle, sheep and swine, in the United States at the present time, is submitted, as a very near approach to the actual number, viz:

Horses, Mules and Asses.	Whole number in 1847.
Number in 1840.....4,335,669	
Increase since estimated at 22 per cent..... 953,847	
	5,289,516

Neat Cattle.		Whole number in 1847.
Number in 1840,	14,971,586	
Increase since estimated at 22 per cent.	3,293,748	
		18,265,334
Sheep.		
Number in 1840,	19,311,374	
Increase since estimated at 22 per cent.	4,248,502	
		23,559,876
Swine.		
Number in 1840,	26,301,293	
Increase since estimated at 22 per cent,	5,786,284	
		32,087,577

NOTE.—In consequence of the rapid development of the pork business in western states, and the consequent greater increase of swine than in other portions of the Union, we have, in another place estimated the number of swine in the United States at 35,000,000. The latter probably is nearer the true number, and we shall assume it in our estimate of the consumption of corn by domestic animals. For similar reasons we have estimated the number of sheep at 25,000,000.

We, therefore, estimate the consumption of Indian corn, by domestic animals, as follows, viz:

	Bushels.
Consumed by 5,289,516 horses, at 5 bushels per head,	26,447,580
" 18,265,344 neat cattle, at 1 bushel per head,	18,265,516
" 25,000,000 sheep, at ¼ do. do. do.	6,250,000
" 35,000,000 swine, at 5 do. do. do.	175,000,000
" Poultry,	5,000,000
	230,963,096

This estimate of the consumption of Indian corn by animals, is believed to be sufficiently liberal, after appropriating to them the entire oat crop, and a due allowance of potatoes, turnips, and other vegetables, large quantities of which, are used for the food of beasts.

In addition to the quantity of Indian corn consumed by men and animals, probably 25,000,000 bushels are used in distilling and for other purposes.

We now deduct the consumption of the country from the aggregate quantity of grain produced, and thus exhibit the surpluses remaining on hand for exportation:—

Wheat.	Bushels.	Surplus for exp'n. Bushels.
Quantity produced in 1847,	114,245,590	
" used for seed,	11,424,550	
" consumed,	62,239,200	
	73,663,750	40,581,750

	Bushels.	Surplus for exp'n. Bushels.
Indian Corn, or Maize.		
Quantity produced in 1847,	539,350,000	
" used for seed,	6,000,000	
" consumed by men,	103,732,000	
" consumed by animals,	230,963,096	
" used for distilling and other purposes,	25,000,000	
	365,695,096	173,654,904
Rye.		
Quantity produced in 1847,	29,222,700	
" used for seed,	3,652,587	
" consumption estimated,	10,373,200	
" used for distilling, &c.	10,000,000	
	24,325,787	5,296,913
Buckwheat.		
Quantity produced in 1847,	11,673,500	
" used for seed,	723,343	
" consumed,	6,000,000	
	6,723,343	4,950,935
Total surplus for exportation to foreign countries,		224,384,502

Liberal deductions may be made from the estimate above, and yet there will remain a surplus of breadstuffs in this country far greater than the demand of all the corn importing countries of Europe.

It now remains to inquire:

III.—*What countries are purchasers of breadstuffs—What the probable extent of their demand—And which are the countries with which the American agriculturist must compete, with their estimated surpluses and prices.*

In the month of December enquiries were submitted by the Patent Office to certain American ministers and consuls abroad, for information in relation to the product of corn, in the countries in which they reside; whether sufficient was produced to subsist their inhabitants; and what quantity, if any, would be required from other countries. Prompt attention was paid by the functionaries referred to to the enquiries of this office, but unfortunately the offices to which they applied, were unable to furnish the information sought for.

The object of these enquiries, was, to enable the Patent Office to lay before the country an estimate of the probable de-

mands of foreign countries for American produce, during the present commercial year.

The famine which unfortunately prevailed in Europe in 1846 and 1847, caused a very considerably increased demand for American breadstuffs and provisions. That calamity resulted from the destruction of the potato crop, and from scanty harvests generally. The harvests of corn abroad in 1847, were abundant. The potato was much injured by the plague which has assailed it, but suffered less than in the previous year. On the whole, then, it is believed that the foreign demand for American breadstuffs and provisions, during the current commercial year, will be much less than it was in 1846, but considerably greater than in average years.

It cannot be desired that years of dearth and famine should occur in any country, to occasion an increased demand for the great staples which our favored country produces in such teeming abundance, and therefore, the American agriculturist should not base his calculations upon the necessities of other countries which grow out of casual periods of scarcity or calamity. On the contrary, he should look to the steady demand which results from their ordinary wants. He will then know how large a demand there is to be supplied, and whether he can furnish the supplies needed at lower prices than the agriculturist of other countries which produce surpluses for exportation.

We have taken some pains to ascertain the countries which are likely to import grain in ordinary years; the extent of their demands; the countries which produce surpluses; the amount of their surpluses; and the prices at which grain, (more particularly wheat) can be purchased and transported to England, which may be regarded as the great corn mart of the world.

The following may be regarded as the principal corn purchasing countries of the world, viz: Great Britain, France, Holland, the West India Islands, British American colonies, Brazil and South America generally.

The following table, compiled from Spachman's statistics of the British Empire and the British Almanac, shows the quanti-

ty of wheat and wheat flour imported into Great Britain, the quantity exported, and the quantity delivered for consumption, during a period of ten years, commencing with 1837.

Table exhibiting the quantity of wheat and wheat flour imported into Great Britain, the quantity re-exported, and the quantity entered for home consumption during ten years, commencing with 1837 *and ending with* 1846, *expressed in bushels.*

Year.	Imports. Bushels.	Exports. Bushels.	Entered for home consumption. Bushels.
1837	8,875,936	2,467,362	6,408,576
1838	15,387,200	1,268,968	14,118,232
1839	24,885.832	340,096	24,545,738
1840	20,213,160	697,936	19,515,224
1841	23,385,512	443,120	23,142,392
1842	22,165,176	1,207,560	20,957,560
1843	24,322,152	503,736	23,818,736
1844	8,519,536	661,240	7,858,296
1845	11,055,816	3,840,008	8,215,808
1846	18,815,256		23,582,656
	10)177,625,576	11,400,024	172,163,218
Annual average,	17,762,557	1,140,002	17,216,321

In 1847 the whole quantity of all kinds of grain imported into Great Britain was 10,840,000 imperial quarters, or 86,720,000 bushels. What portion of it was wheat, we have not been able to ascertain precisely.

The following statement is taken from a letter of the London correspondent of the "National Intelligencer," and professes to be an "exact statement of grain imported into the United Kingdom, and money paid for it, during the last two years, as stated in late parliamentary proceedings:—

Grain imported, 1846,..... 4,770,000 quarters.
Do. do. 1847,.....10,840,000 do.
Paid for grain, June, 1846, to January, 1847,..... £5,139,000
Do. January to July, 1847,..... 14,184,000
Do. July to October, 1847,..... 14,260,000

Cost, in fifteen months,..... £33,583,000

The national loss from the potato disease is estimated at £33,000,000."

The ordinary demand of Great Britain hereafter may be set down at 20,000,000 of bushels annually of wheat. A large quantity of other grain will also be required.

We have not been able to obtain the returns from other countries for a series of years. But, from the best authorities which

we have been able to consult, we have compiled the following table, exhibiting the quantity of wheat (exclusive of other grains) required by the principal corn purchasing countries of the world.

Table.

Countries.	Quantity required.—Bushels.
Great Britain,	20,000,000
France,*	5,000,000
West Indies generally,	2,500,000
British American colonies,	2,250,000
North America generally,	350,000
South America generally,	1,900,000
Holland,†	1,000,000
Total,	33,000,000

The ordinary annual demand for wheat in the principal corn importing countries of the world, is not far from 33,000,000 bushels. This demand is, of course, affected by extraordinary causes. Occasionally a plentiful harvest will diminish it; while, on the other hand, a short harvest, or destruction of some crop, like the potato, will greatly increase it. In 1847, it was greatly increased by the latter cause.

If the estimates submitted of the surplus of wheat raised in the United States be correct, it will be seen that the American agriculturists are able to supply the ordinary demands of the corn importing countries of the whole world. But they have competitors in this great commerce of breadstuffs, and it remains to see who they are, and the extent of the competition.

The principal grain exporting countries in Europe appear to be Russia, Prussia, Denmark and Sicily; in Asia, Syria; in Africa, Egypt. We have two estimates of the quantities of grain which the countries above named produce (or import from other countries) for exportation. The first which we submit is

* During the year ending June 30, 1847, France imported 9,827,515 hectolitres of cereal grains, or about 27,025,665 bushels. "*De Cultivateur, ou Journal Des Progres Agricoles,*" for September, 1847.

† Holland is an entrepot for corn imported from Germany and other states on the Baltic, and destined for other countries.

an estimate prepared for the London Mark Lane Express, of April 5th, 1847. It was prepared at a season when enquiry was keen and active for the sources when the great deficit in the English and Irish harvests was to be supplied.

Table exhibiting the countries (except the United States,) whence Great Britain could receive supplies in 1847, *and the quantities of all kinds of grain which could be obtained from them; prepared for the London Mark Lane Express.*

Countries.	Bushels.
Russia on the Black Sea,	16,000,000
Russia on the Danube,	12,000,000
Russia, northern ports,	4,000,000
Egypt and Syria,	4,000,000
Prussian, Pomeranian and Danish ports on the Baltic,	1,600,000
	37,600,000

The second estimate we submit, is in the form of a table, compiled from a table published in McGregor's Commercial Statistics, vol. 2, p. 738, embodying the British consular returns for 1843. The information which it contains, having been obtained by the most careful enquiry in every corn mart in Europe, is unquestionably the most reliable. It embraces only wheat, and exhibits, at one view, the surpluses at the different grain marts, the prices on ship-board, cost of transportation to England, and total cost in England, reduced to equivalents in federal money

Table exhibiting the surplus quantity of wheat for exportation at the principal corn marts of Europe, the average prices per quarter, and average cost of transportation to England, and the average cost when landed in the ports of England, exclusive of duty.

Grain Markets.	Quantity of wheat for exportation.		Price per quar. on ship-board.	Cost of freight to England.	Total cost and freight.	Total c'st and fr't red'd to th'r equivalents in fed. mon.	Cost per bushel in England, exclusive of duty, in federal money.
	Quarters.	Equival'nt in bushels.					
			s. d.	s. d.	s. d.	dolls. cts	dolls. cts.
St. Petersburgh,..	192,500	1,540,000	39 1	4 8½	43 9½	10 61	1 32½
Riga, ...	.....	.....	49 7	4 9	54 4	13 17	1 64½
Liebau, ...	30,000	240,000	43 7	4 9	48 4	11 72	1 46½
Odessa,.....	150,000	1,200,000	26 6	10 0	36 6	8 76	1 09½
Warsaw, ...	300,000	2,400,000	36 0	3 9	39 9	9 64	1 20½
Stockholm,.....	1,000	8,000	32 6	4 9	37 3	9 03	1 13
Dantzic,.....	315,000	2,520,000	40 0	3 9	43 9	10 61	1 32½
Konigsberg, ...	65,000	520,000	42 6	5 0	47 6	11 52	1 44
Stettin,.....	250,000	2,000,000	40 0	4 6	44 6	10 79	1 34½
Memel, ...	5,964	47,712	35 0	4 6	39 6	9 58	1 19½
Elsinore,.....	175,000	1,400,000	33 0	4 3	37 3	9 03	1 13
Hamburgh,.....	538,000	4,304,000	40 6	3 9	44 3	10 73	1 34
Rotterdam,.....	.....	.....	55 0	2 3	57 3	13 88	1 73½
Antwerp,.....	.....	.....	56 5	2 3	58 8	14 22	1 77½
Palermo,.....	200.000	1,600,000	38 0	8 3	46 3	11 21	1 40
Total,.....	2,222,464	17,779,712					
General average,.			40 6	4 9¾	45 3¾	10 99	1 37¼

Notes.—*Riga.*—Rye, barley and oats, are the principal grains exported from Riga. The following are the only returns (which we find in McCulloch's Commercial Dictionary,) we have been able to obtain of the export of wheat, viz :

Years.	Quantity in Russian lasts, (about 95 bushels.)	Quantity in bushels.
1831	11,365	1,079,875
1832	4,957	470,346
1833	407	38,665

Riga depends upon Courland and Lithuania for her supplies of wheat for export, and those are not always to be relied on. The British Consul at Riga, in his report under date of Nov.

30th, 1841, says the harvest in these provinces for that year has only turned out satisfactory with regard to spring corn, whilst the wheat and rye crops have not yielded even a middling average; so that but little rye and no wheat can be looked for from these two provinces for next year's exportation." We are inclined to think that Riga will not hereafter be a large exporter of wheat.

Odessa.—The export of wheat in 1846, was 1,955,316 chetwerts, or 11,700,000 bushels. While the exports of Odessa increased in 1846, that of many of the ports mentioned in the table above, greatly diminished.

Rotterdam.—According to a table published in McGregor's Commercial Statistics, vol. 1, p. 824, the value of "grain, or corn and flour for food," exported from Rotterdam in 1841, was £207,280. Allowing fifty five shillings per quarter, it would seem that the quantity exported in 1841 was 75,374 6-11 quarters, or 602,997 bushels. This quantity included rye. We have been able to find no later returns of the export of grain from this port.

Antwerp.—The value of all kinds of grain from this port in 1839 (the total returns we have) was 766,200 francs, or about $147,481. The export is therefore small.

Palermo.—The estimate in the table is for abundant harvest only.

From the two tables above, we infer that the whole quantity of wheat produced for exportation, by the grain exporting countries of the world, excluding the United States, is not far from 20,000,000 bushels, and that the great rival of the United States is Russia. She produces the most and sells it the cheapest, certainly at the port of Odessa on the Black Sea. She has, however, but few ports, and her means of transportation from the interior, are not so great as those possessed by the United States. It is doubtful, too, whether Russia can produce grain cheaper than the western States of the American Union. From enquiries submitted during the last summer, answers to which

will be found in Appendix No. 3, it appears that the cost of growing wheat in the United States, is as follows, viz:

In New Hampshire,	$1 10	per bushel.
" New York, western,	64	"
" Pennsylvania	40	"
" Ohio, northern,	50	"
" Michigan	28 to 67⅓	"
" Indiana,	25 to 35	"

These sums include every expense, (interest on the value of the land being one item), which attends the culture of wheat from the preparation of the land to thrashing and storing. Of course, the cost varies in different years, in proportion as the harvest is abundant or scarce. For example, the cost of raising a bushel of wheat in Michigan is given from four years actual experiment, and was as follows: 1st year a bushel cost the grower 67⅓ cts.; 2d year, 36⅔ cts.; 3d year, 28 cts.; 4th year, 30 cts.

The cost of producing Indian corn is as follows, viz:

	Cost per bushel.
New Hampshire,	50 cents.
Connecticut,	36½ "
Michigan,	30 "—11¾—17¾*
New York, western,	29 "
Pennsylvania,	16¼ "
Ohio, northern,	20 "

In view of the facts above stated, it is confidently believed that the grain-growers of the U. States can successfully compete with those of any other nation in the great corn marts of the world.

We have shown in the last of our tables the cost of a bushel of grain purchased in the leading corn marts of Europe delivered in England. We propose now to submit some facts which will enable the American farmer to judge whether or not the conclusion which we have expressed be sound, that he can compete with the foreign corn grower in the markets of England. And as freight is one of the principal elements of cost, we give

* Cost for three years, affected by short or abundant crops. The estimates are those of practical farmers residing in the states mentioned, and may be relied upon.

a table showing the freight on a barrel of flour and a bushel of grain, on the Erie Canal from Buffalo to Albany, New York, and from Pittsburgh to Philadelphia. And also on the same article from the other principal ports of the United States to Liverpool:

Freights (tolls included) on the Erie Canal to Albany.

	From Buffalo.	From Rochester.
Flour, per bbl,,	75 cents.	56 cents.
Grain, per bushel,	21 "	16 "

Freights from Pittsburgh to Philadelphia.

Flour, per bbl.,	$1 00
Grain, per bushel,	30 to 33 cts.

Freights to Liverpool.

	From Boston.	N. York.	Philada.	Baltimore.	N. Orleans
Flour & meal pr. bbl	24 to 36 cts.	30 to 48	48	66	96 to 1 08
Grain per bushel,	— —	9 to 12	12 to 14	12	— —

The rates of freight from Albany to New York, we have not been able to obtain, but they cannot exceed 2 cents per bushel for grain, and 6 cents per barrel for flour. Add 2 cents per bushel more for storage and other expenses of grain on the way from Buffalo to New York, and 6 cents more for a barrel of flour. The flour barrel will probably cost 33 cents more, and grinding and bolting 30 cents.

Calculating five bushels of wheat to a barrel of flour, the cost of a barrel of flour put up at the Rochester mills in New York, and delivered in Liverpool, would be thus:

Five bushels of wheat at sixty-four cents per bushel, first cost,..... $3,20

Grinding and bolting,.....	30
Barrel,.....	33
Freight to Albany,.....	56
" and charges from Albany to New York,....	12
" from New York to Liverpool (average,)....	39
Insurance, wharfage, &c.,.....	25
	5)5 15

Cost of wheat per bushel in Liverpool when exported in the form of flour,..... $1,03

It is proper to remark that, in the absence of correct infor-

mation, we have estimated some of the items in this calculation, but we believe, sufficiently high to cover the actual cost.

We are therefore confirmed in the conclusion, that the American grain growers can deliver grain or flour at as low a price in England, as the grain growers of any other country, not excepting Russia, on the Black Sea; and that they have it in their power to command the great grain market of Great Britain, and of nearly all the corn importing countries of the world.

"Russia is beyond question the great rival of the United States in the corn markets of the world. We have before us an estimate by a Russian nobleman, prepared for the London Economist, of the average quantity annually of grain of all kinds produced in Russia. The statement is as follows:

"The present population of Russia, in Europe, is 65,000,000, of whom about 15,000,000 are males, engaged in agriculture. On an average there are annually sown, with *winter grain*, 18,750,000 hectares, yielding

	Hectolitres.	Hectolitres.
At least nine hectolitres per hectare, or	168,750,000	
Deduct seed at the rate of two hectolitres per hectare,	37,500,000	
Leaving a clear produce of four and a half fold,, or		131,250,000
Spring grain, 18,750,000 hectares, yielding at least thirteen and a half hectolitres per hectare, or	253,125,000	
Deduct seed at the rate of three hectolitres per hectare, or	56,250,000	
Leaving also a clear product of four and a half fold, or		196,875,000
Together,		328,125,000

Or equal to 112,844,239 imperial quarters.

The annual consumption of 65,000,000 of population may be taken at	195,000,000	
The annual consumption in brewing and distillation,	25,000,000	
The annual consumption for food of horses, cattle, &c. say of 25,000,000 head, (exclusive of refuse from breweries and distilleries, grass and hay),	50,000,000	
The annual consumption for fattening hogs, cattle, poultry, &c.	7,000,000	
Estimated total consumption of the country,		277,000,000
Leaving on the most moderate computation, an average annual surplus for exportation, of		51,125,000

Or 17,582,200 imperial quarters, or 140,657,600 bushels."

One hectare is nearly two and a half English acres. One hectolitre is a little more than two and three-fourths imperial bushels.

Large as the statement from the "Economist" makes the quantities of the grain produced annually in Russia to appear, it may, perhaps, be not too great. We find in McGregor's Com-

mercial Statistics, vol. 2, page 794, the following statement of the produce of grain in Russia, in Europe, derived from Schnitzler's Statistics of that empire in 1835, viz:

Average quantities sown, 50,000,000 chetwerts. Average produce, three and a half for one. Total average produce, 181,000,000 chetwerts, or about 126,500,000 quarters, (or 1,012,000,000 bushels.) Total average consumption, including seed and the supply of distilleries, 141,000,000 chetwerts. Total average disposable surplus, 40,000,000 chetwerts or about 28,000,000 quarters, (or 224,000,000 bushels.) These quantities include grain of all kinds.

In a recent German work of great authority and ability, we have found a very full description of the soil, climate, and productions of Russia, which impresses us with the belief that the productive capabilities of that empire are much exaggerated. We annex a few paragraphs extracted from the work alluded to:

"Agriculture in Russia is still in its primitive state, though the number of products and their quantity is great, no province furnishes more than one half of its natural capacity. For this reason does the soil, *in by far the greatest portion* of Russia, possess no real intrinsic value; the latter depending entirely on the labor of man, so that instead of asking the number of acres, the number of hands that belong to it, form the measure of its value. The best cultivated provinces of Russia are on the Baltic, in the provinces adjacent to Moscow, and in the Russian provinces of Poland; but even in these provinces are to be found immense districts of which not the fifteenth part is as yet taken into cultivation.

The whole area of Russia in Europe is 1,742,145,725 Prussian acres, of which 676,000,000 are covered with forests and underwood; 771,000,000 acres are wholly unfit for cultivation, ("unland;") there remains, consequently, but 246,500,000 acres fit for agricultural purposes, and about 24,500,000 acres capable of being used as pasturage.

Indian corn (maize,) is principally grown on the shores of the Black Sea; the provinces on the Baltic and western Russia

furnish the greatest quantity of hemp and flax; potatoes have but lately been generally introduced; the raising of grain (oats &c.,) for feeding cattle, is entirely neglected.

There exists an official seven years' average for the whole crop of all the Russias, Poland alone excepted. From this it appears that the yearly crop of all Russia yielded 167,112,224 chetwerts; while that of Poland alone amounted to 280,906,000 chetwerts.

According to official reports on the state of agriculture, it appears that in 1832, there were used as seed 19,260,088 chetwerts of winter grain, and in the spring of 1833, 28,920,754 chetwerts of summer grain, making together 48,189,842 chetwerts of grain.

The exports from Russia were—

In the Year	(One chetwerts is equal to six English bushels, nearly).
1830	3,935,000 chetwerts.
1831	3,790,000 "
1832	3,500,000 "

In 1833 there was an entire failure of crops, which in 1834 caused the permission of free importations of grain which, from a partial failure of the crops of 1834 was, by an imperial ukase, dated December 1st, 1834, extended, for the ports of the Black Sea and the Sea of Asof, to the 1st of January, 1836, and in consequence of a new total failure of crops in southern Russia, further extended by the ukase of the 9th January, 1835, to the Austrian and Prussian frontier and the ports of the Baltic and the White Sea. The abundant grain crops of Poland, especially in the Woiwodships, Sendomir, Lublin and even Massovia, have already been colebrated in the middle ages; but they are more owing to the excellent soil than the progress of agriculture in that country.

[Note by J. R. S.—By comparing my estimate of the value of grain and the cost of transportation, with those in the preceding extract, it will be seen the commissioner has not made any estimate of cost or transport in the valley of the Mississippi, and that I have adopted medium prices from which a just estimate may be formed of the *present* abilitiy of the countries to supply

any foreign demand, and at the same time affording remunerating prices to all classes engaged in either the growth, manufacture, or transport of breadstuffs. My estimates of the manufacture *are based upon practical experience.*

Wheat at Cleveland, is sometimes as low as 60c. per bushel, and corn 25 cents per bushel; flour barrels have been sold here for less than 25 cents each; freight at this time (Aug. 1848,) to New York, is 65 cents per barrel of flour, and wheat 20 cents per bushel. From New York to Liverpool flour is now carried for 22 cents.

Estimates based at these prices, would place a barrel of *Dried* wheat flour in Liverpool, at a cost to the manufacturer, as follows:

4⅔ bushels wheat at 60 cents,	$2,80
Barrel,	25
Drying and grinding,	25
Transportation to New York,	65
Charges in do	10
Freight to Liverpool,	22
	$4,27

At the above ratio, a barrel of Dried Corn Meal may be delivered in Liverpool for $2,42.

In a former estimate of milling; I stated the cost of manufacture at 10 cents per barrel, but in my table of estimates I say in some cases 20 cts., and in others 25 cts. The drying in steam mills is done by escape steam, without the least daily expenditure; in mills where the steam has to generate for that purpose, it does not exceed from 1 to 2 cents per barrel. But with millers it is the custom always so to count cost as to leave the mill a profit to cover extra contingencies, to which all machinery is liable.

These estimates may be considered extremes, which cannot be reached at present. As the country becomes more densely populated, there will be an increase of agricultural surplus, with a decreased price of labor, and an increase of transport facilities at greatly reduced prices. Within the next five years, but very

little, if any, of the public lands lying east of the Mississippi, will remain for entry. Much of the large surplus now in the west, is required for the sustenance of the hordes of emigrants who are now pouring in, to make the fertile and famed west yield to their efforts its thousand fold.

Shipping Grain to England—Prices in New York and Liverpool.

The tab'es which we have given below are particularly interesting, and should be preserved by every dealer and farmer as a future reference. By comparing the current rates at any period of the year, wheat and corn, in New York and Liverpool, with the estimate here given, the probable shipments can be readily conjectured. In order to cover costs and charges, wheat must be bought in New York, and sold in Liverpool at the following rates:

Price in New York.			*Price in Liverpool.*	
75c.	per 60 lbs.	require sale	a 5s. 9½d.	per 70 lbs.
80c.	"	"	a 6s. 0½d.	"
90c.	"	"	a 6s. 7d.	"
95c.	"	"	a 6s. 11d.	"
100c.	"	"	a 7s. 2½d.	"
105c.	"	"	a 7s. 6d.	"
110c.	"	"	a 7s. 9½d.	"
115c.	"	"	a 8s. 1d.	"
120c.	"	"	a 8s. 4½d.	"
125c.	"	"	a 8s. 8d.	"
130c.	"	"	a 8s. 11d.	"
135c.	"	"	a 9s. 2d.	"
140c.	"	"	a 9s. 5d.	"
145c.	"	"	a 9s. 8d.	"
150c.	"	"	a 10s.	"

Where freights range from 11d. per imperial bush. of 70 lbs. with 5 per cent. primage, to 2s. per bushel, there should be added to the above rates from 1½d. to 1s. 6½d. per bushel. The sales in New York are always made at 60 lbs. the bush. and in Liverpool at 70. The charges are made up of the following items:—Say ex. at 7 per cent.; commission, &c., 4 per cent.: brokerage, &c., 3c. per bush., marine insurance, 1½ per cent.;

dock and town dues, cartage, storage, fire insurance, loss in wt. 2½ per cent.; commission for selling, &c., 4½ per cent., to which must be added the current rates of freight.

Corn.—Indian Corn, by the same rule, with 7 per cent. exchange, and 9d. sterling freight, with 5 per cent. primage, gives the estimate below. In order to *cover cost and charges*, the purchase in New York and the sales in Liverpool, must be at the following rates:

Prices in New York.			*Prices in Liverpool.*		
45c.	per 56 lbs.	requires sales	a 30s.	2d.	per 480 lbs.
50c.	"	"	a 32s.	1d.	"
55c.	"	"	a 34s.	1½d.	"
60c.	"	"	a 36s.	3d.	"
65c.	"	"	a 38s.	4d.	"
70c.	"	"	a 40s.	6d.	"
75c.	"	"	a 42s.	8d.	"
80c.	"	"	a 45s.		"
85c.	"	"	a 47s.	3d.	"
90c.	"	"	a 49s.	6d.	"
95c.	"	"	a 51s.	9d.	"
100c.	"	"	a 54s.		"

If freights range from 10d. (with 5 per cent. primage) to 2s. per imperial bushel, there must be added to the above rates from 9½d. to 12s. per 480 lbs.—*Onondaga Democrat.*

Shipping Flour to Liverpool.

We take the following table from the Rochester Advertiser, says the Detroit Free Press, and it will be found of great interest to dealers in flour, and should be preserved for reference. It will enable them to have at hand the price in New York, which would induce orders from abroad when governed by Liverpool prices.

Flour bought in New York at $4, would cost on board ship at 7 per cent. exchange, 18s. sterling per bbl., including the highest cost to foreign buyers—say 4 per cent. commission for buying and dealing, with 12½ cents per barrel for half inspection, head-lining, cartage and brokerage. This cost of 18s. sterling, with a freight of 3s. sterling and 5 per cent. primage, would cost in Liverpool 23s. 9d. sterling, including the Liver-

pool charges on sales; so that it would require sales in Liverpool at 23s. 9d. in bond, to cover a cost of $4 in New York.

In the above, as in the following estimates, we take the *highest* charges in all cases. Purchases and sales are often made with less cost on both sides, but these are *safe* estimates. Any thing which can be saved, either from purchase or sale, from the charges above enumerated, will, of course, so much lessen the sterling rate which would be required to cover cost and charges. In order, therefore, to cover cost and charges, purchases must be made in New York, and sales made in Liverpool at the following rates:

FLOUR.

Price in New York.	*Sales in Liverpool.*
$3 1/4 per bbl., would require sales at	21s 5d
3 3/8 " " "	22
3 1/2 " " "	22 7
3 7/8 " " "	23 2
4 " " "	23 9
4 1/8 " " "	24 3
4 1/4 " " "	25
4 3/8 " " "	25 7
4 1/2 " " "	26 3
4 5/8 " " "	26 10
4 3/4 " " "	27 5
4 7/8 " " "	28
5 " " "	28 7
5 1/8 " " "	29 2
5 1/4 " " "	29 9
5 3/8 " " "	30 4
5 1/2 " " "	30 11
5 5/8 " " "	31 6
5 3/4 " " "	32 1
5 7/8 " " "	32 8
6 " " "	33 4
6 1/8 " " "	33 11
6 1/4 " " "	34 6
6 3/4 " " "	35 1
6 1/2 " " "	35 9

These estimates are made with exchanges at 7 per cent. When they are more or less than this, (at present being about 10 per cent.,) of course the sterling rates will be reduced or increased in proportion. If 5 per cent. primage be charged, there

must be added to the above rates the following charges for freight:

If freights are—	Added to the above rates—
3s 6d per barrel	6¼d per barrel.
4 "	1s 1¾ "
4 6 "	1 7¼ "
5 "	2 2 "
5 6 "	2 8¾ "
6 "	3 3¼ "
6 6 "	3 10 "

Amount of Breadstuffs received at the Hudson River, 1847.

Barrels of Flour	3,952,972
Bushels " Wheat,	4,143,830
" " Rye,	295,119
" " Corn,	6,053,845

Lake imports into Buffalo of Breadstuffs.

	1843	1844	1845	1846	1847
Barrels of Flour,	917,621	915,100	746,750	1,375,500	1,857,000
Bush. of Wheat	1,827,241	2,177,500	1,770,740	4,745,000	6,489,100
" " Corn,	223,963	137,978	54,200	1,445,308	2,868,300
" " Rye,	1,332	1,617	1,170	28,250	70,787

Amount of Breadstuffs received in Cleveland, Ohio.

	1846	1847
Barrels of Flour	358,355	644,913
Bushels of Wheat,	1.672,340	2,130,317
" " Corn,	527,270	1,3?1,291

Exports from Cleveland in 1847.

Barrels of Flour,	701,870
Bushels of Wheat,	2,066,484
" " Corn,	1,433,669

[Note by J. R. S.—There are many other ports on the lakes whose exports make up the aggregate received at Buffalo, besides large shipments to Canada and New York, via Oswego.

Exports of St. Louis, Mo., in 1847.

Barrels of flour,	448,614
Sacks of Corn, (2½ bushels to a sack,)	395,683
" " Wheat " " "	640,239
" " Rye, " " "	2,250

The following passed from North Carolina through the Dismal Swamp Canal, year ending Sept. 30, 1847.

Bushels of Corn,.....1,226,988
" " Wheat,..... 41,639

Exports from New Orleans of Flour and Corn for 2 years, from 1st Sept. to 31st August, 1846 and 1847.

Barrels of flour,.....1,892, 694
Sacks of Corn, ($2\frac{1}{2}$ bushels,).....3,452,402

Rochester Flour Trade.

The Rochester Democrat furnishes a review of the flour trade at that place, which we copy in an abridged form.

The following table shows the amount of flour shipped from Rochester for three years past, during the season of canal navigation :

	1845	1846	1847
Total,.....	518,318	540,232	588,080

To ascertain the whole quantity manufactured in the place, it is necessary to add to the above amount the 20,000 barrels forwarded east by rail road during the suspension of navigation 30,000 for home consumption, and a few thousand barrels exported by lake. This will show an aggregate of about 650,000 barrels turned out by the Rochester mills in 1847, yielding, with the bran, shipstuffs, &c., to the state, a revenue of 200,000 dollars.

The supply of wheat is derived from the Erie canal, Genesee Valley canal, Tonawanda rail road, Lake Ontario, and wagons from the country adjacent. The following will show the receipts by canal. The column for 1847 is brought down to December 1st, since when a few thousand bushels were received :

	1845	1846	1847
Total,.....	1,042,426	1,034,096	1,879,110

The receipts by the Erie canal have increased this year, 25 per cent., while there is a considerable falling off in those by the Genesee canal.

The receipts of wheat by rail road are estimated at 150,000, and those by the lake at 60,000 bushels.

The mills, to manufacture 650,000 barrels of flour, require 2,825,000 bushels of wheat.

Amount necessary to supply the mills,		2,825,000
Receipts by canal,	1,879,110	
By rail road,	150,000	
By lake,	60,000	
		2,089,110
Amount supplied by team,		835,890

Method of judging the quality of wheat—Selection of seed—Growth of wheat in Russia—Experiments in cultivating wheat on the Rhine—Analysis—Difference of flour in making bread—The difference to the United States, when wheat fails to yield the average number of pounds to the bushel—Table showing difference in yield of flour from wheat of different weights per measured bushel.

As to the *mode of judging* of wheat, we are instructed by a high authority that the dimpled end of the grain should be distinctly marked, and the point from which the little roots proceed should be somewhat prominent; the end from which the blade springs, should also be slightly covered with hairiness or wooliness. The little protuberances at either of those ends must not have been rubbed off, as the grain is thereby rendered unfit for seed, as it has lost its vitality. Kiln-drying also destroys its vitality, and such seed as has been kiln-dried will be indicated by the unusual hardness of the grain, as well as its smoky flavor. The surest way, however, is not to rely on the point of hardness, but to germinate it near the fire in a glass, with as much water as will swell the grain. If damaged by salt water, its taste will be saline, and if for the purpose of remedying it has been washed and dried, it will lose its bright and have a blackened appearance. Wheat that has been heated in the stack will taste bitter on being chewed, and if long kept in the granary, smell musty and look dull and dusty. If eaten by the weevil, it may be detected by pressing the kernel with the fingers.

More attention, undoubtedly, should be paid to the selection and preparation of seed; and reference should be had likewise

in this to the nature of the soil, climate and mode of cultivation. As a general rule it is believed to be well established that grain of northern climates will succeed better in southern than the reverse. Some interesting experiments on the different varieties of grain are mentioned as having been tried by Gen. Harmonon of Wheatland. As he is a well known and experienced wheat grower, they are of value, and we therefore refer to them. See Am. Agriculturist for Sept. 1847.

There is, however, in almost all experiments tried in our country, too great want of the precision of the European ones, and especially of those of Germany, where everything is reduced to the rules of economic proportions, and valuable deductions can be made on account of the regard paid to the most minute particulars which may affect the result. In the communication furnished to the office by Mr. Fleischmann, contained in appendix No. 1, may be found some interesting facts respecting the wheat crop of Germany, and in Mr. Ellsworth's letter also, in Appendix No. 16, some remarks respecting the same subject at the west.

The remarkable fact is mentioned in Silliman's American Journal of Science, that in the North of Russia where the mean temperature is as low as 20° Far., all the cereal grains are cultivated with success, although there are only two months and a half or three months between ploughing and harvest, and in some cases the soil was frozen to the depth of 7 feet, and near the place mentioned, on penetrating the ground, it was frozen to the depth of 175 feet. (?)

The attempt has been made to convert wheat from an annual to a perennial plant, and it is said, with some good degree of success. The account given, is that was discovered by the steward or director named Kern, of an estate at Constance. After he had plowed and manured the land, he then sowed it with summer or winter wheat. In the spring, before the ear makes its appearance, he mows it. This he does repeatedly several times in the course of the season, using it as a kind of hay. After this he allows the plant to grow, and he harvested as

usual. The next year it ripens earlier and bears a much larger crop than wheat cultivated in the usual manner. In autumn it is manured like the grass of meadows, and in the spring the weeds are removed. The effect is stated to be such that from one field four successive harvests have been gathered. The subject is one of considerable interest, as no doubt, if rendered perennial, it would be useful for the purpose of forage. It might be well for some of our enterprising farmers to test the principle, as it is so easily done, and fuller information relating to it is needed. We have sought for some more satisfactory history of the matter, but as yet have been unable to light upon any thing which will give it. At present it is too vague to entitle it to much reliance, though the particular fact does not appear to be at variance with analogy in regard to improvements, quite as great, of numerous plants, by particular cultivation.

According to Kreyssig, the color of wheat and strength of the cuticle depend upon the proportion of clay in the soil. Thus he states, that on a mild soil, the skin is much thinner, and it is whiter; on a heavy soil, thick, and the color more yellow. The yellow has the heaviest kernels and shells out more, but in equal measure gives less flour than the white, which is more delicate and more exposed to the bran.

With respect to the fat-forming principle, it appears, by the analysis of Prof. Johnston, the proportion of the different parts of the grain stands thus:

1000 lbs. of whole grain contains.....,28 lbs.
" " fine flour, " .....20 lbs.
" " bran, " .....60 lbs.

The bran is, therefore, much the richest in this principle, and the whole grain ground together is nearly one-half richer than the fine flour.

As to the muscular matter, it is stated that,

In a thousand pounds of whole grain, there is....156 lbs.
" " fine flour, " ....130 lbs.

Respecting the bone and saline material,

Of a thousand pounds, the bran contains,.....700 lbs.
" " whole meal,.....170 lbs.
" " fine flour,..... 60 lbs.

In this respect, therefore, the bran is vastly superior, and the whole meal has nearly three times as much nutriment as the fine flour.

Taking the whole three substances together, according to Prof. Johnston, of a thousand pounds, the three substances contain of the ingredients mentioned:

	Whole Meal.	Fine Flour
Of muscular matter,	156 lbs.	180 lbs.
Of bone material,	170 "	60 "
Of fat, "	28 "	20 "
	354 lbs.	210 lbs.

And so, in this respect, the whole meal is one-half more nutritious than fine flour.

The difference of flour in the making of bread, is often very great. Mr. Lance, in a lecture on agriculture in England, stated that a sack of inferior flour, weighing 280 lbs., would generally make 80 four-pound loaves, the increase of weight being 40 lbs., but a sack of superior flour of the same weight, has been known to make 93 four-pound loaves, or the gain is 92 lbs. A very glutinous flour will absorb by far the most water. So that 3 lbs. of flour will make a four-pound loaf.

There is one more consideration which deserves some attention in relation to the wheat crop. The bushel of wheat weighs less some years than it does others, and the difference often amounts to two, three, or even four pounds. Though this may seem of comparatively little consequence for a few bushels, yet for the aggregate of the wheat crop of the United States, or for a State, or even a County, it makes a great difference.

Suppose, for instance, one year the crop of the United States should amount to 110,000,000 bushels, and weigh but fifty-nine pounds per bushel, and in another, the quantity should be but 108,000,000, and yet weigh sixty-two pounds per bushel; the last crop, though less in quantity by two millions of bushels, would exceed the former in weight by 200,000,000 of lbs. But this is not the whole state of the case. We learn from good authority that a bushel of wheat weighing fifty-six lbs., yields but 46¾ lbs. of flour, while one weighing sixty-two lbs., yields 53½

lbs. On this supposition a still further allowance must be made, enhancing considerably the value of the millions of pounds above mentioned. Were we to estimate the product one year at 110,000,000 bushels, weighing only fifty-six lbs., and another at 108,000,000 bushels weighing sixty-two lbs., then the difference in favor of the latter, though the least in quantity, would amount to 536,000,000 pounds in weight, or more than one million and a quarter of barrels of flour.

The following, from cheques of different dates, in 1840, with respect to wheat ground at Cupar, Great Britain, exhibits at once the difference in wheat according to the various weights of the grain per bushel:

Date.	Wheat sent.			Goods returned.				Tot'l loss	Per bush.		Wt per bu.
				Flour.		Bran.					
1840.	bush.	cwt.	lbs.	cwt.	lbs.	cwt.	lbs.	lbs.	lbs.	oz.	lbs.
Jan. 16	120	63	0	53	26	8	65	133	1	1⅜	59
19	56	30	28	25	16	4	61	63	1	2	60½
22	80	40	66	34	20	4	70	88	1	1½	56½
27	120	63	91	52	77	9	105	133	1	1⅛	59½
30	120	63	28	53	20	8	102	130	1	1⅛	59½
Feb. 15	240	130	21	108	46	19	10	301	1	4	61
24	96	52	92	44	64	7	0	130	1	5⅜	61½
28	240	126	14	106	9	17	12	329	1	6	58⅜
March 3	48	26	10	21	66	4	4	52	1	1½	60½
5	240	129	14	108	36	18	23	301	1	4	61½
8	120	60	0	50	14	8	42	168	1	6	56
10	128	70	70	60	100	8	62	132	1	0½	61½
19	56	30	49	24	101	4	102	60	1	1	60½
20	240	127	56	106	24	18	48	318	1	5	59
27	120	26	35	51	43	9	61	145	1	3⅛	58
April 1	96	52	56	44	44	9	18	106	1	1⅜	61½
8	56	30	18	25	16	4	56	58	1	0½	60½
24	240	128	64	106	80	19	0	320	1	5½	60
27	56	30	105	25	64	4	90	63	1	2	60½
May 8	168	92	70	79	22	11	84	188	1	2	61½
22	240	129	84	107	36	19	84	300	1	4	61½
28	120	60	0	50	40	8	0	184	1	8½	56
June 15	160	82	21	67	70	13	0	175	1	7½	58
22	240	127	60	106	91	18	0	305	1	4	59
July 13	240	128	64	106	102	18	94	316	1	5	60
20	200	110	80	95	89	13	66	199	1	0	62
27	160	82	96	68	22	13	0	186	1	0	58
Aug. 3	240	128	64	107	34	18	84	282	1	2½	60
10	240	127	98	105	44	20	2	276	1	2⅜	60
14	200	110	80	94	52	14	34	218	1	1½	62
24	240	128	64	106	44	19	42	314	1	5	60
31	240	129	36	106	92	19	84	308	1	4½	60⅛
Sept. 7	160	82	96	68	21	13	7	180	1	2	58
14	240	128	64	106	98	18	105	309	1	4½	60
17	120	65	50	54	68	9	66	150	1	4	61
24	80	42	56	35	34	6	22	112	1	7	59
Dec. 2	40	21	65	18	15	2	108	54	1	5	60½
Total ..	5,800							7,096	av'ge	3⅜	

The bushel in above table, is the English bushel of 70 lbs.; the cwt. is 112 lbs.

MAIZE IN MEXICO.

From the Vienna Zeitung—by H. Carl Heller. Translated by E. Goodrich Smith of the Patent Office.

Maize, (zea mais Linnæus,) not only on account of its elegant structure, splendid leaves, delicate inflorescence, and variety of color of its pliant stalk, is one of the most beautiful of the grass kind, but likewise one of the most useful, and indeed, for Mexico and a large part of America, truly the most useful of them.

Its beauty the Mexicans have at all times acknowledged; they yet here adorn the alters in the churches and chapels with the stalks of maize, in which are twined flowers. Among the ancient Mexicans. maize was a sign in the calendar, and a holy ornament upon their groves.

The Incas of Peru cultivated maize in their gardens as elegant plants, and among artistic works in gold of the ancient Peruvians, the imitations of the maize plant are the most admirable.

From what has been mentioned, the value of this plant to the inhabitants of America, is evident, as well as the proof that its culture was known, and especially in Mexico, long before the discovery of the new world.

It is well established that maize was not known in Europe, till after the conquest of Mexico, and we know, likewise, that Ferdinand Cortez, after his first return to the court of Charles V., 1519, among the presents from Mexico, had some ears of maize.

Notwithstanding that, we cannot certainly fix upon Mexico as the true native country of this plant, yet America was indeed so, for only the Mexicans, the inhabitants of Hayti, and some

natives of South America, had any peculiar names for maize—a circumstance that is not without importance, because we may assume that an object for which my language has no designation, is of foreign origin.

Thus, for example, the Indians of Mexico have no word for wheat, barley, oats, apple, pear, grape, fig, sweet orange, &c., which they designate by the Spanish words, *trigo*, *sevada*, *avena*, *manzana*, *para*, *uva*, *figo*, *narranja*, &c., but for all domestic fruits and plants they have, as *tlaolli* (zea maiz,) *choyotesllé* (lycios edulis,) *mamei*, (mameia Americana,) *pitaya*, (cactus pitoga.) *cacahuates*, (arrachis subterranea seu hypogeal) *magney* (agave Americana,) *jomatl*, (solnum lycopersicum.)

Our word maize comes from the Haytien word *mahiz*, from whence it is formed by corruption.

The Chinese and Japanese have also a peculiar word, though it was already known among these nations before the discovery of America. Thus the Chinese call maize *ya-chu-chu*, corn of *chu* or *ya* (kidney) or *yu my*, rice resembling a kidney. The Japanese call it *nanbamthbi*, that is, corn of *new bran*, or, by nick name, outlandish (foreign) corn, as the Germans, for example, call it Turkish wheat. It is, therefore, more than probable that the maize of the new world came to the old as an exchange, for had the Asiatic people carried maize to America, they would also have planted the cereals far more important for the old world. If, then, we admit that all men sprung from one stock, it must be that the first inhabitants of America separated from their Asiatic brethren before the cultivation of the cereals were known.

Notwithstanding, maize is nowhere found in the wild state, for as to that wild maize of Dr. Hernandez, it is very much as with his wild wheat, which he would have it he had discovered, and which he named *triticum michoucum*, but which is nothing but *triticum compositum*, and came from Europe.

We often find in Mexico, single plants of maize which grow self-sown, and flourish without culture, and though they may stand miles from any inhabited places, they cannot be consider-

ed wild, as, notwithstanding the often monstrous variety, they always bear the characteristics of cultivated maize. By the parrots, for example, which comes from the east, from the *terra caliento* to the *terra templada*, in large flocks to visit the maize fields, the kernels of maize may be borne to a distance and thus sown.

It is the same with maize as with the other cereals of Asia, considered as their native country. So far we may consider America as the native country of maize; neither are those found wild.

Notwithstanding the many varieties of maize which are found in Mexico, yet there is only to be found the Linnæan species "mais." Here, in this country, indeed, we distinguish two kinds—a *maiz alto* and a *maiz temporal*, but they present no botanical difference.

The best known cultivated varieties in Mexico are—

1. *Maiz de padus*, with small eight-rowed ears; the most unimportant of all varieties cultivated here.

2. *Maiz manchado*, or *Chinesco*. A productive kind, with white, yellow, and red kernels; sometimes, also, entirely blue, in which case it is called *pinto*.

3. *Maiz blanco*. A very productive variety, which yields a fine, sweet meal.

4. *Maiz amarillo*, which is subdivided into two varieties.

(1.) *Maiz amarillo grueso*, which is more frequently cultivated, and rarely yields less than 2 to 3 ears each, with 300 to 600 kernels.

(2.) *Maiz amarillo pequeno*, which is somewhat smaller, less stout, but in a fruitful soil weighs 10 to 15 cwt. more than the grueso.

5. *Maiz cuarenteno*, better known in Mexico under the name of *maiz tremes*, or *olote Colorado*, which ripens quickly, and may be planted in the coldest districts in Mexico.

6. *Maiz tardio*, or *de riego*, the most productive of all the varieties, and that which is cultivated around the City of Mexico, and in many moist regions. It sometimes reaches to 500

per ct. Maize succeeds best in a moist and warm climate, but it has the great advantage above other cereals, that it may be successfully cultivated in Mexico as well in the *terra caliente* (warm districts) as in the *terra fria* (cold ones.) Its highest limits here, are from 2000 to 8000 feet above the level of the sea, therefore the time necessary for it to ripen is very different. It varies in all the periods from 7 months to 6 weeks.

Maize is the most important plant in Mexico, and the failure of the crop by drought, hail, wind or disease, produces the saddest consequences.

The diseases of maize most known in Mexico, as well as the hurtful animals, are the following:

1. *La raquitte*, a kind of wasting consumption which affects the maize where is sown on barren soil, and shortly after the seeding is subjected to moist cold weather.

2. *El carbon.* A vegetable carbonaceous growth, which grows in the ears, or causes the buds to be abortive. This abortion, as in the oak and other plants, appears to be produced by an insect.

3. *El hango.* A species of *uredo*, which forms itself particularly in the ear, and destroys it. The disease is here called *los cuervos*, (the raven).

Of Animals, &c.

1. A kind of mole, (*talpa*) which digs under the fields and destroys the young plants.

2. The larvæ of melolontha, (*kantor o' gusano turco*), which not only seizes on roots, but also often destroys the stalks and ears.

3. Many owls and phalænas. (?)

Maize may be cultivated in Mexico at different times, especially in those districts where for nine months there is sufficient moisture. In the *terra caliente*, they take the best spot lying nearest the house, cut down the trees and shrubs, burn them and plant maize.

But in the cooler districts they have two kinds of culture, that

with watering and that in the dry lands, (*siembra de regadio y de secano*). Of the latter we have again different methods, which are called *de humedo*, *de aventureso*, and *de temporal*.

In the *de regadio*, the kind *maiz tardio* is sown, which is the most productive, and a variety very similar to the same in a soil of constantly equalized moisture at the commencement of spring, (*de humedo*).

A seeding which is made in a soil that has the capacity of preserving the moisture of the winter and first spring rains, is called *siembra de aventureso*.

In the *de temporal* a quickly ripening kind is sown, (*maiz cuarenteno*), which is cultivated either before, or in the rainy period, (June to November), if before, and it is also sown on dry land, then this is called *siembra en polva*, (*sowing, or seed on the dust*).

Often the Mexicans take no pains to select the soil, and frequently cultivate maize on strata or hardened clay, (*tepetate*) where the crop is very small.

How much Mexico produces at the present time it is impossible to determine with any accuracy, but it is thought that it is the principal subsistence of at least five millions of persons, and at the same time, is the only corn fodder for all the kinds of domestic animals, so that its collective product must be, at least, 10,000,000 of metzen. [As a metzen is 1.68 English bushels, this is equal to nearly 17,000,000 bushels, and it would seem must be underrating the crop].

The different parts of the maize, and the modes in which it is used in Mexico, are the following:

A. Of the plant.

1. The ancient Mexicans made of the juice of the stalk, sugar, and the modern Mexicans, a fermented drink, named *pulque de maiz o mayo*. Experiments, also, have succeeded in making brandy of the same. The extremely saccharine stalk is eaten raw by many Indians.

2. The unripe ears, (*Ind. gilote, Span. mazorca*), are cooked, and serve many poor people for their sole subsistence.

3. The leaves and stalks serve as excellent fodder for horses and mules.

B. Of the dry plant.

1. The stalks and leaves* are used as well for the fodder of animals as also for the construction of small houses and huts, the walls of which are made of stalks, and like roofs of houses.

2. Of the ripe corn is prepared, similar to barley, a kind of beer, (*chicha*), an agreeable and healthful drink.

3. Of the maize meal, boiled in water, and in connection with different roots, many kinds of paste, (*atolli* or *atole*), and a kind of bread called *arepa*.

4. The ripe kernels roasted, which are there called *esquite*, as well the meal prepared of it (*pinole*) are used often in the *terra caliente*.

5. Finally, maize is consumed in still greater quantities by the Mexicans in *tortillas*, which are prepared in the following manner:

The maize kernels are placed in a vessel with water, and softened for a time by the aid of lime. Then they are rubbed on a flat stone (*metate*) into a fine mass, and from this are formed very thin round cakes, which are baked on a thin clay plate. They are taken hot from the plate and eaten, and thus supply the place of bread to the Mexicans, to which the *tortillas* are preferred.

A Mexican woman spends daily at least six hours in the preparation of the *tortillas*, and in the whole republic, according to the estimate of H. Azcarale, are thus engaged 312,500 stout and healthy women. Were it not the sole labor of the Mexican wives, we might well cry out, what a monstrous loss of time!

Finally, I must yet mention that paper (*papel de oja de maiz*) is also made from the leaves, and the raw leaf in the south is used for the preparation of the so called straw cigars — *cigaritos*.

*The ends of the stalks, cut off from the ear before they are ripened, are called Ind. *tet lazale*, the other stalks, dry on the fields, *rastrojo*. The former are taken off for fodder of horses. A field of maize is called *milpa*.

This is, in brief, that which is most worthy of notice respecting maize in Mexico.

Toluca, 30th September, 1846.

[Note by J. R. S.—Maize or Indian corn can never be produced as cheaply in Mexico or any other warm climate, as in the middle and western United States. In these States the climate and soil is peculiarly adapted to its culture; farther south it must be planted farther apart to give it air, and it has many enemies to contend with. Southern U. S. corn, or corn grown in the tropics, is not adapted to northern use; instead of gluten it contains albumen, and it has much less oil than northern corn.]

ANALYSIS OF OATS.

Oat meal is the common food of a great portion of the lower classes in Great Britain, and in some other parts of northern Europe.

The oat is dried on the common kiln by direct action of fire heat; it then undergoes a process to rid it of its chaff; it is then ground into a coarse meal, and is used without bolting.

Much of its nutriment is lost by the chemical change of drying by the usual process.

In a former report we presented an extract from an English journal respecting the weight per bushel of some varieties of oats. The following table relates to the analyses of a number of the same varieties including also one other—the common:

Species of Oats.	Husks.	Starch.	Gluten.	Albumen	Sug. Sugar, Gum & Oil	Water.	Total.
Hopetown,	22.5	54.0	1.7	2.1	3.6	16.0	99.9
Common,	23.2	51.8	1.0	0.8	7.2	16.0	100.0
Potash,	21.6	55.0	1.5	1.9	4.0	16.0	100.0
Landy,	22.5	53.2	2.0	1.9	4.0	16.0	99.6
Black Tartarian	23.9	51.9	1.1	0.6	6.5	16.0	100.0
Siberian,	26.9	49.7	1.1	1.8	3.9	16.0	99.4
Early Dyock,	22.4	53.0	0.9	0.1	6.4	16.0	98.2
Early Angus,	22.6	52.7	1.5	0.5	6.0	16.0	99.3

The inorganic constituents of the plants are given by a number of analasists, as follows:

	Seed.		Straw.	Salm. Horshmer.	
	Boussingault	Knop & Schned.	Levi.	Seed.*	Straw.*
Potash,	12.9	13.6	12.18	20.40	43.90
Soda,	——	——	14.69	1.90	4.00
Lime,	3.7	1.3	7.29	3.15	4.84
Magnesia,	7.7	8.6	4.58	14.30	3.44
Phosph'c acid,	14.9	16.5	1.94	42.54	0.51
Chlorine,	——	——	——	——	6.80
Sulph. acid,	——	——	——	1.70	4.50

* Grown in soil containing no humus.

The most perfect analysis of this plant, however, is that contained in the essay of Prof. Norton, for which he received the premium of the Highland Agricultural Society. This was published by the society in the volume of their Transactions embracing the period from July, 1845 to March, 1847, and is a fine specimen of analysis conducted on scientific principles. Prof. Norton took the plant at different stages of its growth, and examined carefully into its constituent parts. His figures differ from those above given, as also from the analyses made by other persons. Thus, for example of the grain:

	Potato.	Hopetown.
Starch,	65,60	65,24
Sugar,	0,80	4,51
Gum,	2,28	2,10
Oil	7,38	5,44
Casein (avenine)	16,29	15,76
Albumen,	2,17	0,46
Gluten,	1,48	2,47
Epidermis,	2,28	1,18
Alkaline salts, and loss,	1,75	2,84
	100,00	100,00

The analyses given above, are extracted from the Com'r. of Patent's Report, a comparison of which, with the analysis of Indian corn, (see page 46,) will show the superiority of the latter for *all domestic puposes*.

The cost of the oat and the labor of its preparation, render it a much higher priced food, pound for pound, than dried Indian corn meal.

By the following quotations it will be seen that the prices in places from which their products can be transported to tide water through the northern channels, range above the usual average, owing to the demand for shipment to Europe, while the prices in southern and interior markets, which are situated upon streams tributary to the Mississippi, and which have no other avenue to a market, are very much less, owing to their distance from the "Commercial Emporium" and *the risk of damage from shipment through the Gulf of Mexico.*

Prices of Flour, Wheat, and Corn at latest dates, received at Cleveland Sept. 1, 1848.

	Flour.	Wheat.	Corn.
New York,	5,50a5,68	105a125	55a65
Boston,	5,62a5,75	—— ——	64a65
Philadelphia,	5,25a5,50	103a110	58a59
Baltimore,	4,94a5,00	90a106	48a56
New Orleans,	4,00a4,50	60a75	40a45 sacked
Albany, N. Y.	5,37a5,62	110a119	58a61
Buffalo, "	4,75a4,87	95a96	40a43
Oswego, "	4,87a ——	105a—	—— ——
St. Louis, Mo.,	3,25a3,50	50a65	30a— sack'd.
Cincinnati, O.,	3,80a3,85	70a75	28a30
Cleveland, "	4,50a4,75	90a93	40a—
Toledo "	—— ——	90a—	40a—
Sandusky, "	—— ——	90a—	39a—
Columbus, "	4,00a——	70a—	25a—
Lafayette, Ia.,	4,00,a4,25	75a80	25a28
Terre Haute, Ia.,	—— ——	—— ——	15a18
Vincennes, "	—— ——	—— ——	15a20
Evansville, "	3,75a——	65a70	28a30 sacked
Peoria, Ill.,	3,75a4,00	65a—	15a20
Keokuk, Iowa,	4,00a——	50a55	15a16
Detroit, Mich.	4,50a4,56	—— ——	—— ——
Nashville, Tenn.,	—— ——	—— ——	18a22

From the Philadelphia Ledger, Aug. 25th.

THE MONEY MARKET.

The principal crops of cotton, corn, wheat, rice, sugar and tobacco, all promise greater abundance than perhaps was ever gathered before from the fertile soil of the American States. Prices of some of these crops may rule low—at least lower than last year—but the result must be a very considerable increase in the exports of the country. It becomes, then, very interesting to know what prices the product is expected to command in the foreign markets. From present appearances, it is highly probable, that with an exception or two, the profits will be more remunerative to shippers than last year, because the official returns indicate the capacity of the people to consume to be great. Another favorable indication of continued prosperity, is the recent exportation of large quantities of Indian Corn to the British Islands, where it is finding a ready sale. *It is evident from this that an average crop in those islands is no longer adequate to the supply of the population. We may, therefore, look for a steady demand for this grain, in the production of which, as we showed other the day, we can defy the competition of the world.* Should the potato crop fail again this year, as is now reported, we shall be called upon to make up the deficiency from our ample stores. Although the English crop of wheat will prove at least an average one, there will still be an outlet for our surplus. The consumption of all produce may be considerably increased, the more so that bread at all events will be cheap in England. If, then, the sales of the United States crops are large, the returns will be equally so; and we cannot sell $120,000,000 or $130,000,000 worth of produce abroad, unless the proceeds return to us. We repeat, the prospects of the nation are flattering.

FOREIGN GRAIN MEASURES.

The following is a correct statement in American bushels of the various European measures of grain:

	Am. Bushel.
English Quarter,	8 28-100
English Imperial Bushel,	1 4-100
Dantzic Last,	87 15-100
Amsterdam Last,	83 37-100
Hamburg Last,	91 42-100
Rostock Last,	105 71-100
St. Petersburgh Tchetwert,	5 49-100
Odessa Tchetwert,	6 6-100
Naples Tomolo,	1 57-100
Leghorn Sack,	2 — —
Genoa Ermme,	3 34-100
Spanish Fanegue,	1 62-100
Lisbon Alquiere,	41-100
Copenhagen Tonne,	4 74-100
Swedish Tonne,	3 97-100
Mayence Mattu,	3 37-100
French Hectolitre,	2 75-100

THE BUSHEL BY WEIGHT.

An act of the Ohio Legislature of Feb. 8, 1847, establishes the following as the weight of the bushel:

Wheat,	60 lbs.
Rye, Flax seed or Indian corn,	56 "
Barley,	48 "
Clover seed,	64 "
Oats,	32 "

STAFFORD'S STATIONARY DRYER.*

[PATENTED APRIL 18, 1848.]

TO WAREHOUSE-MEN, PLANTERS, AND FARMERS.

The STATIONARY DRYER, represented in the following engraving, is peculiarly adapted to the use of either the warehouse-man, planter or farmer.

My opinion, as expressed herein, is, that the grain used for breadstuffs, should be manufactured before it is exported to foreign countries, the reasons for which will be found on page 40, but for the internal and coasting trade, this would be found to be impossible; therefore, I deem this invention as important as that of the Revolving Dryer.

It will be perceived that in the use of this Dryer, all machinery is dispensed with, and the grain descends by its own gravity, and that its passage through the caseing may be accelerated or impeded by the regulating slide at the base. It may be made of any length or height, or several may be placed side by side, according to the amount of business required to be done. The condensed steam may be returned as water to the boiler, a little below the boiling point, in the same manner as is shown in the engraving of the Revolving Dryer and Cooler; consequently no supply is required for the boiler, except for the vapor lost at the safety valve, when the steam is raised to a greater pressure than required. The boiler may be placed 100 feet, if necessary, from the warehouse or barn, provided the steam pipes are covered with woolen cloth, to prevent condensation—for farmers' or planters' use, a potash or cauldron kettle may be made use of to generate steam.

* This chapter was misplaced through inadvertence.

When grain is dried it may be kept in bulk, which exposes less of its surface to the atmosphere; grain, when dried, may be shipped in bulk, which saves 7 to 9 cents per bushel for sacking, and 17 to 20 per cent. on transportation, owing to the exclusion of moisture; no damage need be feared from weevil, and the price is greatly enhanced when in market.

The drying process does not injure its vitality, as will be seen in the following extract from the proceedings of a meeting of the Farmer's Club, of Am. Institute, N. Y., June 6th, 1848.

KILN DRIED CORN WILL VEGETATE.—Mr. Meigs exhibited specimens of Indian corn dried by Stafford's process—grown since the last meeting of the Club—*establishing the fact that this process* does not, in any degree, impair the vegetative powers of grain.

Heated grain, if not moulded, may be restored to its original state.

Weevil is destroyed by the process of drying

Garlic is destroyed by this process, and its fumes pass off by the free ventilation shown.

Grain may be dried before it is manufactured, but as it takes longer to expel the moisture from a dense body than when it is pulverized, a larger quantity may be dried as meal within a given time upon the Revolving Dryer than by the Stationary Dryer, although in small mills the Stationary Dryer may be preferred in some cases.

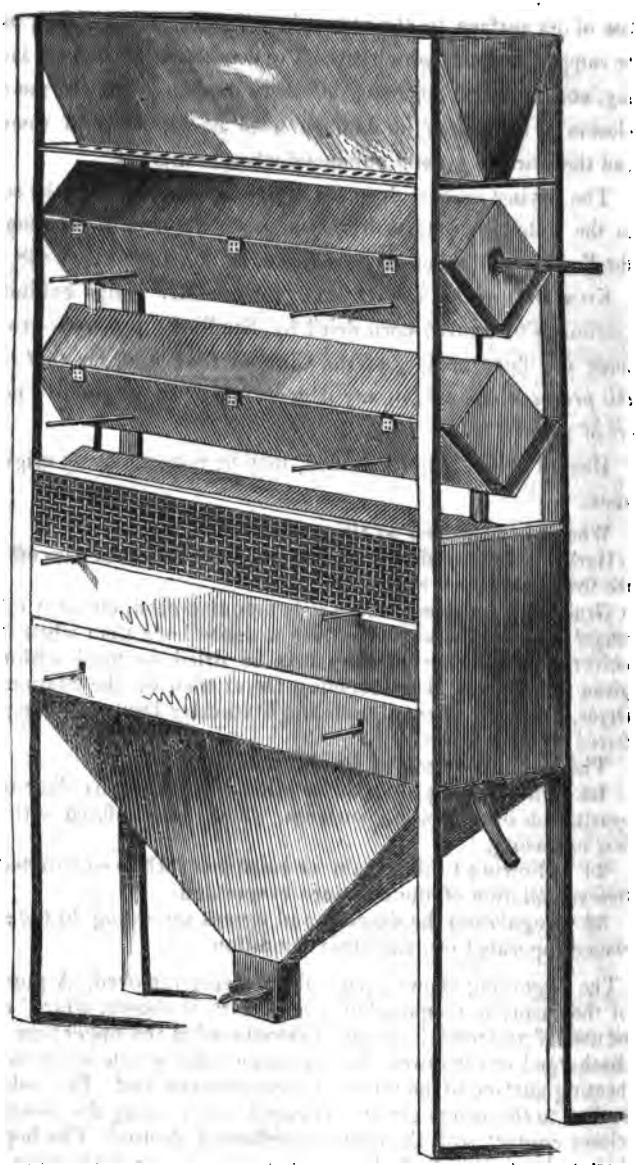
The principles secured by this patent, are—

1st. The passing of grain or other substances by their own gravitation over heating surfaces, which are confined within a box or casing.

2d. Allowing to the grain or substance, while so situated, a free ventillation of the moisture evaporated.

3d. Regulating the descent and egress according to the substances operated on, and their condition.

The engraving shows a part of the casing removed. A portion of the casing is composed of screen wire as shown, which may be used if preferred. Steam is introduced at the upper pipe and discharged at the lower. Steam connections are shown from one heating surface to the other, at each alternate end. The rods attached to the wings are so arranged as to bring the wings in closer contact with the heating surfaces if desired. The hopper being always supplied, the quantity passed over the heating surfaces is regulated by the slide at the base of the hopper.



CONCLUDING REMARKS.

To insure breadstuffs against change, it has heretofore been deemed necessary to destroy the vitality of the grain by a high degree of heat, and then grind it. My inventions are based upon the principle, that "*without the presence of air and moisture, no organic body can change.*"

The common method destroys nutriment, and gives a different flavor and color to Indian meal, which is the only grain to which the process is applied in the United States; and it is only so prepared for exportation, principally for slave consumption in the West Indies. My opinion was and is, that more enlightened persons would require breadstuffs which had not undergone a chemical change, and we see its effect now in Europe, from the grain bearing a proportionate higher price than the kind of meal alluded to; the risk of sending the grain has induced the shipment of meal, and the profits of shipment have no doubt been with the latter; but when the prices of corn and those obtained for meal manufactured by my process are compared, (see letter of E. W. Andrews & Co.) the balance will be found to be largely in favor of shipment of meal.

This preamble I deem important to a full knowledge of the differences I have defined. As, then, the object I sought to accomplish could not be attained by any *practiced* method, my attention was directed to the requisites for attaining the desired end.

Knowing that flour and meal were non-conductors—that to expel the moisture they must be kept in motion—that to prevent their being *scalded* the ventilation must be free, and that to prevent their chemical change, the heat must be uniform and be

below a certain temperature: wholly engrossed with the subject, and my circumstances being such that I had leisure to devote to experiments, many devices were tried, and the Cylinder Dryer, as shown, was adopted as the only one which in its operation combined all the requisites, occupied the least space, cost the least money, and required no personal attention, and would remain as durable as the building in which it was placed.

For drying grain, the same arguments will apply to the Stationary Dryer. The great result of these inventions to the United States will be, that the markets of the world can now be supplied with our surplus crop of Indian corn. All classes in society will consume it. The operative abroad can as well subsist in part upon it, as the operative in New England, who consumes more of it than of wheaten or any other flour. Domestic animals in many countries will be fattened upon it. Its nutrition, and the economy of its use, must produce these results.

It was, and no doubt will be said, that steam has been used in various ways for heating and drying purposes: that paper is so dried; and that attempts with partial success have been made to dry grain and its product; hence my inventions are of no great importance, and when the real necessity of the case required them, they would have been made. So, had it been important to have had an egg stand on end, the *wise ones* might have known how, without the teachings of Columbus.

The knowledge that steam contained power has not been confined to the past century; its application to machinery in a rude manner had long been made, when Bolton and Watt invented and put in practical operation the high pressure engine, which from time has remained the same, and is likely to remain the cheapest and most effectual agent ever created by man.

The effects of my inventions will be found to be of greater value to the people of this continent than the invention of the Cotton Gin, because their use will become more universal, while the use of the Cotton Gin is confined within "a few degrees of latitude—a mere spot."

Those who will use my inventions do not require all the information contained in these pages to induce them to purchase, to make known the *fact* that breadstuffs prepared by my processes bring more money, is all that the manufacturer or dealer requires to know.

What has influenced me to make these inventions, has been higher considerations. While all others with whom I conversed saw but a temporary disease affecting the potato, the main subsistence of millions in Europe, to my mind it was evident that it was to be either a total annihilation of that esculent, or the disease was to continue until other sources of subsistence were substituted. *The commencement of the potato disease and the first general surplus of breadstuffs in the United States was to me a striking coincidence*, for I believe it is the intention of the Creator to permit the progress of the human mind, and the consequent advancement of civilization. I believe the Creator has destined this continent, with its free institutions, its fertile and healthy lands, together with its other rich and inexhaustible resources, to not only foster this advancement, but that from this country it may be disseminated throughout the world. I do not believe that civilization can advance without commerce and the continual dissemination of all the arts. To favor these, the producer requires a market; without it, he retrogrades until he becomes a shepherd, consuming only his own products, and leading an animal existence.

Without, therefore, a method by which he can preserve and transport his surplus staple productions, he can have no market. The overburthened countries of Europe require this surplus; for I believe the Creator, in destining this country for the greatness she is to assume, has been equally beneficent to his creatures in the Old World. The observations of every reflecting mind must have discovered that when humanity is compelled to subsist chiefly on one article of diet, that their faculties, passions and propensities bear a greater resemblance to the animal than to the intellectual being. Hence I reason that the blight and partial destruction of the potato, will produce an effect which

will advance civilization, if among no other nations, with the favored Anglo-Saxon race.

How are the foreign consumers to pay us for a portion of their subsistence, steeped as the lower classes now are in poverty?—All densely populated countries can manufacture the finer fabrics cheaper than others. With the increase of wealth and consequent increase of luxury among us, fashions and fabrics will change, and a thousand devices for a thousand different uses of luxury and art, will be used and thrown aside, nearly all of which will be fabricated abroad.

This, however, is in the dim future. The *present* is what the utilitarian looks at. I have before explained that at the present Great Britain has not, nor can she produce, either within her own islands or in any of her colonies, an equal adequate substitute for all domestic uses as Indian corn, nor can she obtain it as cheap either in large or small quantities as from the United States; and the wheat flour that may be required will also be furnished by this country.

Thus dependent on us for our two great staples of corn and cotton, and dependent on her for many necessaries and luxuries for body and mind, not only will our intercourse become more familiar, but our trade more relieved from the shackles of antiquity; the moral power of both countries combined will influence the world.

COMPLIMENTARY.

The following testimonial is from a gentleman who is at the head of one of our most distinguished colleges. He had not only seen the machine in operation, but had used the flour and meal. He remarked, that Whitney, the inventor of the Cotton Gin, had been one of the greatest benefactors of mankind; not because his invention had enriched the south—not because by his invention an aristocracy had been built up in New England who were now investing their surplus wealth through the east and the west in affording increased facilities of travel and transport, but because he had enabled the poor man of the world to be clothed. "Your invention, sir," said he, "will enable the poor man of the world to be *fed*."

I considered that my invention was of great importance for preserving breadstuffs for army and navy purposes, particularly the latter. I went to Washington in May last, and exhibited my process before the committee on naval affairs in the House of Representatives. While before that committee, I had the voluntary aid of one of the most distinguished scientific persons in the country. The committee, after a careful and protracted examination, caused an amendment to be adopted to the navy appropriation bill, which authorizes the secretary of the navy to purchase flour and meal prepared by my process, to be sent to all the different naval stations; and congress adopted the amendment.

TESTIMONIALS.

From the Board of Trade, Cleveland, O.

The Board of Trade of this city, have, through its Directors, at the request of J. R. Stafford, Esq., of Cleveland, O., examined an invention of that gentleman, for the preservation of breadstuffs. As the result of our investigation, we state that we have witnessed the operation of the machine, and have examined Indian corn, wheat, flour, and corn meal prepared by it. From knowledge so derived, we are fully satisfied that it is an invention of great utility and importance, and fully and cheerfully recommend its adoption and use.

The effect of the process is to exclude, by evaporation, moisture from the grain or meal, and this without injury to its quality or color.

It is this excess of moisture which, in warm weather, usually causes these articles to either become musty, sour, or decomposed, but when so prepared can be held for a long time, and in all weather, or may be shipped to any climate without injury, a consideration of the greatest importance to the producer, manufacturer, merchant, and shipper.

Although this invention is well adapted, and is of great value in the preservation of all cereal productions, still we believe the greatest advantage is to be derived from its application to the drying of Indian corn and its product.

Most nations produce wheat, and in that article may be our competitors in the markets of the world; whereas, in the production of Indian corn, we have no rival, the soil and climate of

a large part of our Territory being peculiarly adapted to its culture.

The product, when so prepared, will, at no distant day, form one of the largest articles of export from our country to Europe, as from its cheapness, ease, and certainty of production, and great nutritious qualities, it must, as an article of human food, and for the fattening of animals, in a great measure supersede all the coarser vegetable productions; and hence, to the grower of this great staple this invention is destined to be in importance second only to what the cotton gin is to the grower of cotton.

By Order of the Directors.

C. W. COE, *Secretary.*

Office of BOARD OF TRADE,
Cleveland, August 19, 1848.

From E. W. Andrews & Co.

ELYRIA, Aug. 8, 1848.

J. R. STAFFORD, Esq.—Dear Sir:—Your favor is received requesting information as to the amount of water I got out of flour and meal dried on a dryer of your invention. I have often tested the thing, and find that I get from flour from 16½ to 20 lbs., according to the condition of the wheat, and from meal I get from 18 to 22 lbs., depending upon the dryness of the corn.

I am now putting up some flour and meal in oil casks for whaleing vessels. I dry the flour and meal, kiln dry the timber for the casks, and then paint them with a *metalic cement* we get here, which will make them impervious to water or dampness. I do not see how it is possible for flour or meal to injure when thus secured; it is impossible for moisture to reach it through the cask, and the article is *perfectly dry*. I propose putting up flour and meal in barrels kiln dried and painted in the same way for the West Indies and South American market, which will make it perfectly safe for shipment. I have dried about 3000 barrels of meal, which has been sent part to New York, part to Canada, &c., and I have yet to hear of the first

barrel having been injured. The meal sent to Liverpool brought from 3s. to 3s. 6d. sterling more than Brandywine, or any other meal in the market at the time, showing that the superior quality of meal cured on your Dryer was appreciated. It simply dries it without destroying the natural taste of the meal. It divests it also of the acidity which makes it unhealthy for many persons to eat. Dyspeptics can eat bread made from dried flour or meal with impunity.

I have no doubt the time is near at hand when the public will see the importance of purchasing these articles prepared by the process invented by you.

Yours, very Respectfully.

E. W. ANDREWS & Co.

From Barney, Waring, & Co.

CLEVELAND, Aug. 3, 1848.

J. R. STAFFORD, Esq.—Sir:—In answer to your inquiries respecting the cost and operation of one of your patented Revolving Dryers, erected by us in the Erie mill and warehouse, we have to state that the cost of the whole apparatus for drying, independent of the Patent right, is under the sum of three hundred dollars.

That in our opinion the machine we have in operation has capacity, with an increased amount of heat, to dry one hundred and fifty barrels of corn meal per 24 hours.

We only use the Dryer during business hours, and with the one pair of stones we now have in operation, we grind at the rate of 80 barrels per 24 hours. The Dryer requires no more attention than do our elevators, or in other words, no attention.

We have sold all the meal we have manufactured either for home consumption, or for consumption in western and northern New York and Canada.

Respectfully Yours, &c.,

BARNEY, WARING, & CO.

OFFICE OF MARINE MILLS,
CLEVELAND, Aug. 20, 1848.

J. R. STAFFORD, Esq.—Dear Sir:—In answer to your note of this morning, we reply that we have not been able to make sufficient experiments, as to yield from wheat, to answer your enquiries to your satisfaction.

The capacity of our Dryer is sufficient only to dry the amount manufactured by two pair of our Burrs, and as our mill is so constructed as to require some alteration to try the yield, we will have to defer it until after the press of the fall business.

We know sufficient, however, to say that, in our opinion, flour dried by your process will be found to be preferable in *all* respects, to the undried article, and that the objection by the manufacturer of the dimunition in weight, will, we think, be made up in consequence of drying before bolting, and the subsequent cleansing of the offal by the duster, while at the same time the increased value of the article, and the certainty of its preservation, under all circumstances, will operate as a strong inducement in the mind of the manufacturer thus to prepare his flour, and in the minds of the dealer and consumer to require the article *thus to be* manufactured.

The heat we use, is the escape steam from our engine, and no superintendence is required for the drying process.

S. R. HUTCHINSON & CO.

From the Albany Evening Journal.

DRIED CORN MEAL.

This meal, from the mill of E. H. LEONARD of Elyria, O., prepared for preservation by STAFFORD'S process, has made its appearance in this market. It has the color, flavor and appearance of fresh ground bolted meal, is perfectly dry, has all its nutritious qualities, divested of its moisture, and is in a state of perfect preservation. Meal dried by this process 18 months since, is now perfectly sweet.

Undried Indian meal can be kept sweet for only a few weeks, and kiln drying has been the only process of preservation. But

drying by heated air imparts to the meal a parched flavor and scorched appearance. Fresh ground meal is preferred to it. Meal dried by Stafford's process (steam instead of heated air) is preferred to fresh ground, being sweeter, divested of its acid, can be used with impunity even by dispeptic persons, and time will not injure it.

The corn crop of the west and southwest, has been deemed of little value for export, as it has been impossible to get it to market in a state of preservation. This large product can be placed in the markets of Europe in a perfect state of preservation, and sold to feed its starving thousands, at a less price than any other substance having the same nutritious qualities.

Experiments have been made upon wheat flour perfectly satisfactory, and that article dried upon this process will soon be in this market, from the mill of HUTCHINSON & Co., Cleveland, Ohio.

We have used some of the meal prepared by this process, and can speak positively of its excellence. The improvement is one of the most important of the age; and cannot fail to greatly increase the export ef Corn meal.

From the Cleveland Plain Dealer.

ERIE MILL AND WAREHOUSE.

Messrs. BARNEY, WARING, & Co., have just completed their new and extensive Steam Mill and Warehouse. It is the most complete and substantial structure that we know of, situated on the Ohio City side, immediately opposite their place of business. The buildings are 70 feet front by 80 in depth, and are capable of storing 80.000 bushels of grain. Above the first story, the building is constructed of plank 2 by 10 inches, laid flat and spiked together; the bins are made in the same manner, thus dispensing with frame work, and giving a strength which resists a pressure, which, in our opinion, no other grain warehouse now erected is capable of sustaining. The principal business intended is the storage of grain. The milling is carried on while the elevating machinery is not in operation. By this arrangement

the engineer and fireman are always on hand, and the engine always ready for the despatch of business.

The Husk frame is fitted for three run of 4½ feet burrs; but one run is now in operation, grinding 15 to 20 bushels of corn per hour, which is then dried on one of STAFFORD's celebrated Dryers, then bolted and packed.

We understand that the demand for Stafford's meal, for home consumption, is increasing very rapidly, and orders are being filled for Canada and along the line of the Erie canal. Our citizens generally have had nearly a year's test of this meal, and all, we believe, (ourselves among the rest) unhesitatingly pronounce it superior in all respects, to any other meal ever used.

From the Albany Evening Journal, extracted from the proceedings of the New York State Agricultural Society.

EXECUTIVE MEETING, Aug. 11, 1848.

Received from J. R. Stafford, Esq., Cleveland, Ohio, through S. B. Gregory, Albany, two half barrels of steam dried Indian meal. We have used of this meal, and are prepared to say that it excels any we have ever used, and cannot doubt that it will prove to immense advantage to the farming interests of our country. One of the half barrels has been distributed, and all who have received it, speak of it as superior to any Indian meal they have ever used. B. P. JOHNSON, *Secretary*.

From the Albany Cultivator for Sept. 1848.

STAFFORD'S PROCESS OF DRYING GRAIN, &c. In our June number we spoke of this invention. Mr. STAFFORD has since sent some corn meal prepared in his way to the Secretary of the New York State Agricultural Society for distribution. We have tried it and found it excellent both for bread and pudding.

I have stated that the cost of drying a barrel of flour would not exceed 1 or 2 cents, when steam has to be generated for the purpose. As the cost of generating steam may not be known

to all who may wish to use my inventions, I append the following certificate, which shows my estimate to be much too large.

TO WHOM IT MAY CONCERN.

We have in use a three horse power engine, for the purpose of propelling our Power Presses, which requires but two bushels of bituminous coal per day, to generate the steam required.

M. C. YOUNGLOVE & CO.

CLEVELAND, Sept., 1848.

From citizens of Albany, N. Y.

We have used Indian corn meal dried by J. R. Stafford's process; the color and flavor are not changed, and its quality is essentially improved. We cheerfully recommend its use in Hotels and private families.

GRIFFIN & SMITH,.....*Mansion House, Albany.*
LANDON & MITCHELL,.....*Congress Hall,* "
ROGERS & BRITTON,.....*Stanwix Hall,* "
A. C. JOSLIN,.....*City Hotel,* "
C. N. BEMENT,.....*American Hotel,* "
EDWIN BEEBE,,.....*Franklin House,* "

GEO. DAWSON, GEO. CAMPBELL,
S. B. GREGORY, E. B. WESLEY,
H. T. MEECH, R. STEELE,
E. A. DOOLITTLE, J. G. COTRELL.
F. G. TUCKER,

From citizens of Cleveland.

The undersigned residents of the City of Cleveland, are now using Indian corn meal dried on J. R. Stafford's Patent Dryer. We consider it preferable to the natural meal because it has no bitterness of taste, and to our knowledge no acid effects have been produced from its use. Added to these qualities it does not become sour or musty, and makes lighter bread, puddings, and cakes.

J. A. HARRIS, *Editor Cleveland Daily Herald.*
T. G. TURNER, *Editor Daily True Democrat.*
J. W. GRAY, *Editor Cleveland Daily Plain Dealer.*

A. S. BARNUM, *Proprietor Weddell House.*
L. A. KELSEY, *Proprietor New England Hotel.*

J. M. WOOLSEY,	N. C. WINSLOW,
N. E. CRITTENDEN,	JOSEPH LYMAN,
CHAS. HICKOX,	I. L. HEWITT,
P. ANDERSON,	DUDLEY BALDWIN,
P. CHAMBERLIN,	C. S. MACKENZIE,
N. C. BALDWIN,	T. P. HANDY,
JOHN W. ALLEN,	GEO. A. BENEDICT,
P. HANDY,	JOHN ERWIN,
ANSON SMITH,	W. D. BEATTIE.

The Hon. JOHN S. SKINNER, formerly Assistant Post Master General, now editor of the Farmer's Library, writes the following introduction to a former pamphlet of the Patentee, which is published entire in the November No. of that interesting and useful publication.

IMPORTANT INVENTION FOR THE GROWERS OF INDIAN CORN.

NEW METHOD OF DRYING GRAIN AND MEAL.

It needs no argument to show the great value of this invention, if it will, as stated—and, we doubt not, very honestly stated—"occupy less space, cost less money, take less fuel, and do more work than any other Dryer;" and when to this is added the fact that it proposes a system of dessication which will defy the effects of a sea voyage and of time—and, moreover, that, by means of it, corn meal can be delivered in England at a less price than their hay, who can fail to see the great power of this new invention for the benefit of the grain grower, or calculate the extent to which it will be brought into play. It is a problem to be ascertained, and the solution of which is not difficult, at what cost corn meal would profitably supersede oil cake, barley, beans, oat meal, &c., now used as food for domestic animals in England?

Turning back for some evidence of the sensibility we were conscious of having felt to the importance and the value to our

country of employing *Indian meal* as food for cattle, and the increased demand which might be expected for that grain to be thus used, if it could be introduced in England, we find the following remarks, published in the American Farmer of April 2, 1819—more than 28 years ago—by the same hand that is now here recalling attention to that subject. It would seem to have been one of those coming events which "cast their shadows before." In a history then and there given of two remarkable beeves, the "Delaware ox" and Columbus, fed and fattened by that experienced and judicious victualer, the late JOHN BARNEY, of Delaware, we made this observation, the correctness of which universal experience sustains: "He, Mr. B., considers that, as a means of fattening cattle, this country possesses *in its Indian corn*, an advantage over England, for which she has no equal adequate substitute. He gives the preference to *Indian meal* over *every other species* of food, for fattening either sheep or cattle, and gives it in its dry, unsifted state. But he gives it as his opinion that a much less quantity of meal will answer, and that it is eaten with better appetite, when used in conjunction with ruta baga. Of this root he has the highest opinion, concurring with Mr. Cobbett in the opinion that it is sweeter and far more nutritious than any other root or vegetable used as feed for live stock." At that time corn at Baltimore was 55 cents a bushel. If this Dryer (which we do not doubt) will perform what is specified, then will the two impediments have been removed which have heretofore prevented the use of Indian corn meal as food for stock in England.

First—Here is a mode for drying, which prevents all danger of the meal becoming sour or musty.

Second—The ports of England have been opened to the importation of it.

Let us exert ourselves for improvement in all departments; hold on, in the mean time, to that which is good, and hope for the best.

Any one having doubts to express, or inquiries to make, may address themselves to the editor of the Farmer's Library, who

engages, for the interest he advocates, to tell the truth though the heavens fall.

From the Genesee Farmer.

The November No. contains the following notice, written by its editor, Dr. Lee:

"Among the thousand new inventions at Castle Garden, no one has interested us so much as an admirable apparatus for drying flour, meal and grain. It employs *steam* to heat the cylinder, and thus maintains at all times a uniform and proper temperature; steam passes through the centre of the cylinder, which is made of sheet iron, has flanches on its outer surface, which carry the meal or grain as it revolves, and thus effectually dries it without scorching. It is cheap, and can be made to dry several thousand bushels in 24 hours. James R. Stafford, Patentee, Cleveland, Ohio."

The New York Express, which had previously noticed the subject, thus speaks after a minute investigation of the machine by its senior Editor.

STAFFORD'S PATENT DRYER.

We recur to this subject again, first, because of the importance of the invention, and next, because it is exciting so much attention at the Fair. The patentee, J. R. Stafford, of Cleveland, Ohio, has evidently bestowed much thought on the nature of our cereal grains. His ideas on the nutritious properties of cob meal, (the corn and cob ground together) which were originally communicated to R. L. Colt, Esq., of Patterson, and by him published in the Farmer's Library, are signal and conclusive. Mr. Stafford's theory for the preservation of breadstuffs from souring or heating, is, simply, that if all the natural moisture contained in grains, flour and meal is expelled by a degree of heat so low that neither the color, quality, or flavor is changed, that the substances so operated upon will keep an indefinite time. In this theory, all, we believe, will concur; because without the presence of moisture, nothing in nature can

change. Having settled in his mind these facts, the next thing was to obtain a machine which would contain a great surface, occupy but little space, and which might be perfectly ventilated, and do a large amount of business. The machine on exhibition proves the simplicity, neatness and efficiency of the invention. We doubt whether it can be improved, and Mr. Stafford seems to have covered the whole ground in his patent. There are but few inventions patented now-a-days that another patentable article may not be constructed that will attain the desired end; this appears to us to be an exception. All who feel an interest in the subject, should carefully examine the operating models. They are placed under the south gallery of the Garden.

From the New World.

IMPORTANT INVENTION.

It is a well known fact that a large proportion of the corn meal and flour exported from the United States to Great Britain, during the last twelve months, has been spoiled by becoming sour. The loss thus incurred by American shippers, has been immense. To remedy similar evils for the future, Mr. James R. Stafford, of Cleveland Ohio, has patented an ingenious machine, a model of which is now on exhibition at the Fair. It is stated by commercial men, to be one of the most important inventions of the age, and as destined to work a wonderful influence upon the trade in breadstuffs, both for domestic and foreign consumption.

From the Cleveland Plain Dealer.

STAFFORD'S DRYER.

We perceive that our ingenious fellow citizen, J. R. Stafford, Esq., is meeting, as we anticipated, with decided success in New York. His Dryer is now exhibiting at the Fair of the American Institute. The notices of the press are lauditory of course. The True Sun says:

One of the most valuable productions of American ingenuity now in the Fair, is *Stafford's process of Expelling the Moisture*

from grain of all descriptions, flour and Indian meal, which is commanding much attention at the Fair. The machine is so simple and durable, the attention required so little, and the process so apparently perfect, that all who deal in breadstuffs should not fail to examine the operating model; steam is the heating agent, and the condensed water is made use of to feed the boiler.

Prof. NORTON, who occupies the chair of Agricultural Chemistry in Yale College, New Haven, had recently returned from a three years sojourn in Europe, where he had been for the purpose of informing himself as to the different modes of cultivation of the soil and of the preservation of the crops. In England he had the opportunity of observing the condition in which breadstuffs arrived there, shipped from this country.

His opinion of the merits of the Dryer, expressed in the following letter, is considered by the Patentee of great importance, but it will be perceived that the Professor was not aware that the samples alluded to in his letter were dried upon a machine in practical operation, nor of the tests to which they had been submitted.

YALE COLLEGE, New Haven, Conn., Nov. 11, 1847.

J. R. STAFFORD, ESQ.—Sir:—I have received the little pamphlet upon your patent Dryers, and have been interested in looking over it. From the reasoning therein contained, from the description of the machine, and from the model which I saw in New York, during the Fair of the American Institute, I should consider the machine very effective, adapted to attain its end of drying meal and grain with expedition as well as completeness. The cost of the operation must be trifling, and very little time need be lost. The *theory* seems excellent, and from the samples of which I have seen, both the grain and meal retain their color and original flavor unimpaired. They are neither *scorched* nor *scalded*. I hope we shall soon have results on a larger scale, and that these may be also quite satisfactory. Every large

mill will then as a matter of course include one of these dryers among its indispensable fixtures. Every ware-house for storing grain or flour, will also be provided with them, and we shall no longer hear of whole shiploads of provisions spoiled by heating and fermentation.

I send one of the circulars recently used by Prof. Silliman and myself. Your invention is so directly connected with my department, that I am much interested in it, and hope most sincerely for its success.

I am Sir, Yours Respectfully,

JOHN P. NORTON.

Prof. MEIGS alluded to the Patentee's dryer in the following remarks which he made at a meeting of the Farmer's Club of the American Institute, which was held in the Institute Rooms in New York, Nov. 17, 1847. The proceedings of the meetings are published in the New York Farmer and Mechanic.

At the late Fair at Castle Garden, we had the pleasure to see a contrivance for expelling the moisture from grain or flour, without in the least degree altering the pure natural taste of the article. This is a machine heated by steam, which gives out all the required heat without the possibility of injury. It leaves the grain, meal or flour in perfect purity, and when once packed in barrels or otherwise, it is almost impossible for them to receive any injury from without, so that they may be transported to any climate or any distance, without deterioration. And although this new process is of very great importance to the export of breadstuffs to foreign nations sometimes immensely so, yet we hold it to be of still greater importance for the preservation of the staff of life from all must, moulder, or other injurious alteration of its native properties *for domestic use.*

Heretofore the breadstuffs have been put up in a moist condition, and millions of barrels of them have suffered great loss by the presence of the moisture in them. The truth is that

when put up dry, they will last as long as the grains of wheat in the Catacombs of Egypt, whence we now have grain which vegetates again after the lapse of two or three thousand years. The reason of this is so apparent, that it seems wonderful that we should not before this time have applied the principle. *No alteration can take place in grain, meal, or flour that is perfectly dry.*

From the New York Courier and Enquirer.

Mr. J. R. Stafford, of Cleveland, Ohio, is the inventor of a new process of *expelling moisture from breadstuffs*, without changing their color, quality or flavor, which has elicited the approbation of intelligent men, and to which the American Institute awarded a gold medal. The machine is a cylinder, armed with flanches, revolving in a trough, and steam is the heating agent used. The condensed steam is used for feeding the boiler, and the heat is regulated by the safety valve.

We are informed that corn meal dried by this process, has been pronounced by persons in this market accustomed to the article, to be superior to any other which had come under their notice. Meal ground in Ohio, and dried in this way, we are told, has been transported by lake and canal boats to this city, detained here as well as on the route for a long time, and then shipped for Liverpool, where it has commanded the highest market rates.

The facts bear strong testimony to the utility of the invention, which we commend to the attention of our commercial readers.

The *New York Tribune*, in a review of the November No. of the Farmer's Library, says:

"There comes a full description with engravings to illustrate the use and value of Stafford's newly invented *Rotary Dryer*

for drying Indian corn, corn meal, &c., so that there will be no danger of its growing sour or musty, under any circumstances which may attend its exportation. This invention promises to be of great consequence to the growers of that noble plant—worthy to take the place of the rapacious bird of prey on our national arms, and more worthy than a bloody sword to be esteemed the glory of America."

CONTENTS.